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Valley custom styles a
STREET ROD
see page 34

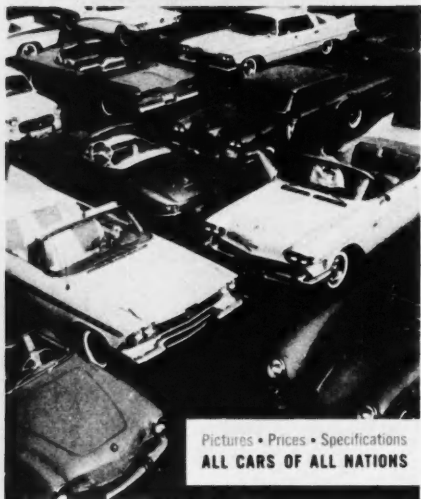


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Vol. 1
Published Monthly
No. 1

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cover

Lovely Adrienne Griset oversees an installation of a new custom tube grille — our Accessory Of The Month. For full details check page 10. Also, we have Ed Thompson's wild little roadster which will be covered thoroughly in a forthcoming issue of Car Craft — Don't miss it.

— Anscochromes by Hardee, Poloczny

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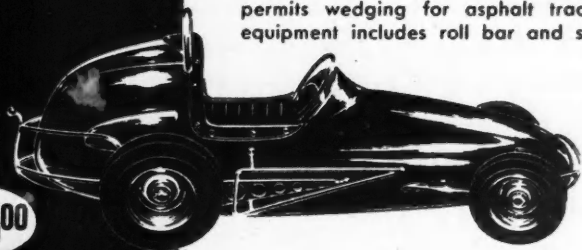
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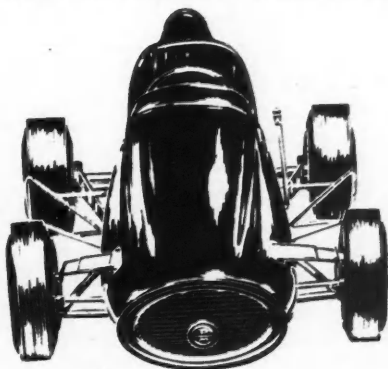
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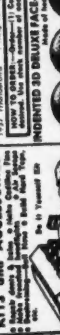
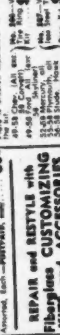
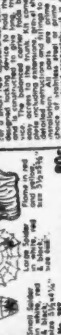
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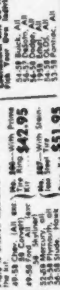
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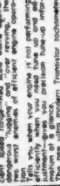
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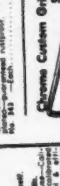
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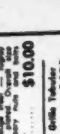
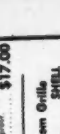
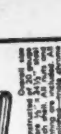
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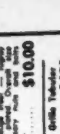
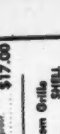
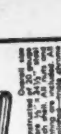
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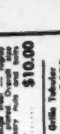
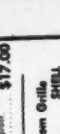
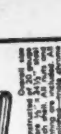
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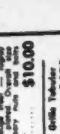
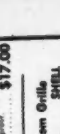
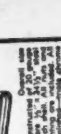
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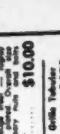
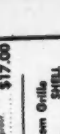
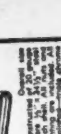
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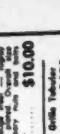
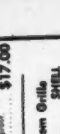
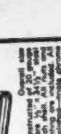
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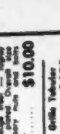
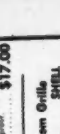
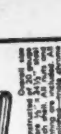
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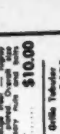
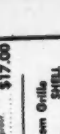
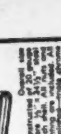
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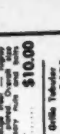
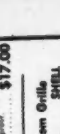
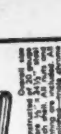
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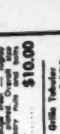
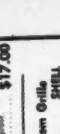
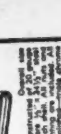
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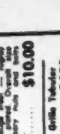
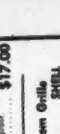
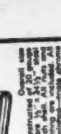
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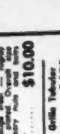
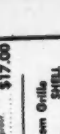
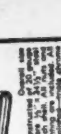
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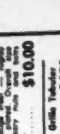
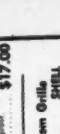
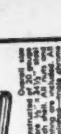
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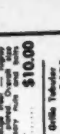
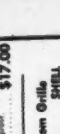
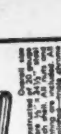
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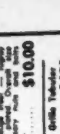
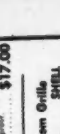
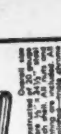
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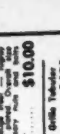
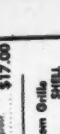
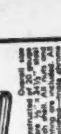
Chrome Custom Grille

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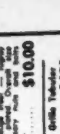
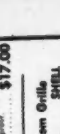
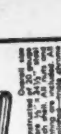
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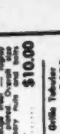
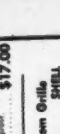
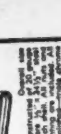
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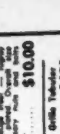
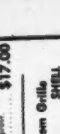
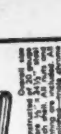
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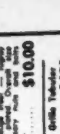
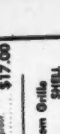
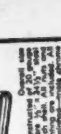
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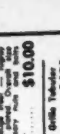
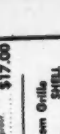
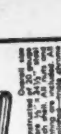
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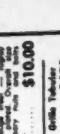
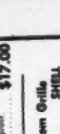
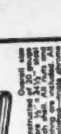
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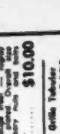
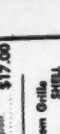
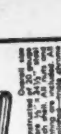
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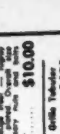
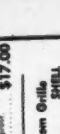
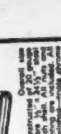
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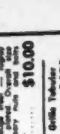
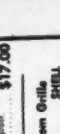
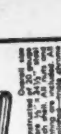
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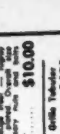
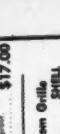
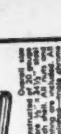
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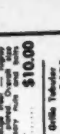
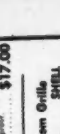
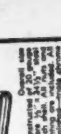
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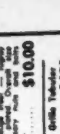
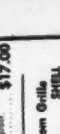
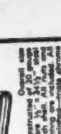
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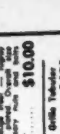
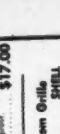
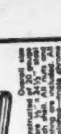
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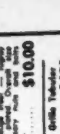
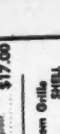
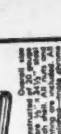
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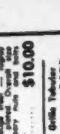
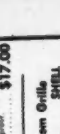
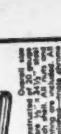
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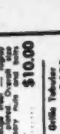
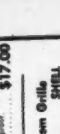
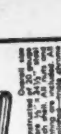
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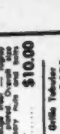
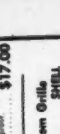
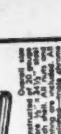
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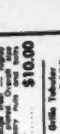
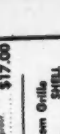
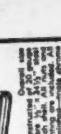
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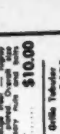
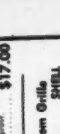
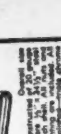
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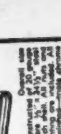
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DE-CHROME for \$6.49

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REPLACES METAL WITH METAL

1. Ream hole with 60° reamer.
 2. Insert Hol-Fil plug from outside.
 3. Tighten nut — twist off screw.
 4. Grind nut flush with body.
- Plugs to fit standard 1/4" or 7/16" holes. Drill odd sized holes to above sizes.

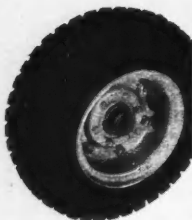
Prices: Complete Kit (Reamer, 50 plugs) \$6.49 ppd. Reamer only \$1.49; Extra plugs \$1.50 doz. \$1.00 deposit on COD orders. Michigan residents add 3% Sales Tax.

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Standard sizes 4" - 5" - & 6" Standard and Super widths. All hub lengths, all bearings from 1/2" to 1" Bore.

All Wheels are STEEL BOLTED construction and cadmium plated.

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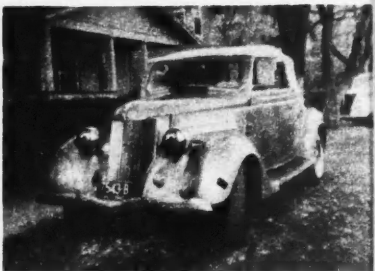
Phone LU 3-1056

LETTERS

SCARCE CONVERT

Dear Sir:

I have many, many, issues of your fine magazine. I use my magazines as a sort of library and wouldn't part with any of them. I espe-



cially like your step-by-step articles on various ideas for car owners, also very clear photos.

Enclosed are some photos of my '36 Ford 3-door passenger convertible. The body is stock. The interior has black and white rolls and pleats, rug, etc., and the engine, a '40 Merc is only slightly altered as yet. The exterior of the car is done in Regency Purple enamel. I haven't seen too many of these around. Thought you would like to see it, and maybe use the photos in some way.

— Bill Ueberroth Jr.
Toledo, Ohio

You are right Bill, we hardly ever see one of these around anymore. When we do, they are seldom in the fine shape that yours is in. — Ed.

FINE COUPE

Dear Sir:

Here is hoping I can see a couple of pictures of my car in your magazine. I haven't seen one *Rod* from West Allis in your magazine for at least two years. So far this car has taken 6 months to build right from the bottom to where it is now. It's a '34 Ford 3-door window coupe with a '50 Olds mill, which has a '53 Olds 4 barrel carb and manifold for power. It has dual chrome stacks for an exhaust system. Olds fiesta hubs set that added touch with 5.70x15 fronts and 8.20x15 rears. By the way that's the original finish on this



car. It has just been buffed out and it gets waxed about every other week.

— *Ralph Nieskes*
West Allis, Wisconsin

Don't worry Ralph, you'll be seeing more rods in our magazine from time to time. Don't wear the point off your coupe with all those wax jobs, it's a real jewel — Ed.

HERE WE GO AGAIN

Dear Sir:

After reading Dave Jarvis' letter on de-chroming with bubble gum (Feb. '58) and Howard Gasgar's comment on body sectioning with that versatile material (June '58), I noticed a comment by "Ed." asking what was happening to all the old gum wrappers. Down here south of the border we are using gum wrappers for hot rods — we peel off the aluminum foil backing and hand-form it into dragster bodies over molds made out of reclaimed tortilla dough. The import duty on cars and accessories from the States is quite high, but we're making do with what we have in true hot rod fashion.

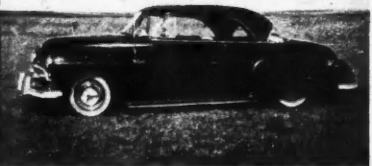
— *Jose Ponce*
Mazatlan, Baja California,
Mexico

Who started all of this? — Ed.

DAKOTA DILLY

Dear Sir:

I have been a reader of your mag for many years now and rank it as tops. Over the years I've been reading your mag I've seen but



very few cars coming out of South Dakota and am hoping my car will rate a place in your mag.

continued

FOR THE BEST IN SKIRTS...INSIST ON

Chris **BUBBLE** Skirts



The **NEEDLE NOSE X-WP**

Will Give Your Car

That **LONG-LOW** Look!

Bubble Skirts to fit all models.
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THE ULTIMATE IN SMALL RACE CARS

Clutch, extra
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RACK & PINION



HERE AT LAST!

An all new rack and pinion steering gear for 1/4 Midgets, Go Karts, Bugs, Coneco Cars, etc. A free steering unit that requires no adjustment and has 4 to 1 ratio. This type unit is being used in every Autopia car at Disneyland. Designed and built by Hartman Engineering Co., it is easily attached to 1/4 Midgets, Go Karts, Bugs, Coneco Cars, etc., simply by adding mounting plate to your frame and shortening tie rods. Your same steering shaft can be bushed and pinned to the pinion shaft.

For further information write:

HARTMAN ENGINEERING CO.

3731 Park Place • CC-7 • Montrose, Calif.

LETTERS

continues

My '50 Chev features a shaved nose with rows of louvers punched in it and dual Appleton teardrop spots. The whole rear end has been cleaned off; fenders, deck and stock taillights which I replaced with '50 Pontiac taillights. The license is moved down to the bumper by a '49 Chev guard. It is painted a deep metallic blue, with hand striping on the outside and dash; each louver is also striped. The fender skirts each have a row of 10 louvers punched in them. The lowering was completed by cutting 2 rings off each coil in front and in the rear the frame is C'd and the floor tunneled with de-arched springs and 2 inch lowering blocks. The inside has been completely re-upholstered in blue and white leather. The mill is a Chev 6 with dual carburetors, hi-lift rocker arms and headers which run through steel pac mufflers and out through 6 1/2 foot chrome side pipes.

Hope it rates a place in your mag, as would appreciate seeing it in print.

— *Bernie Lockert*

Lemmon, South Dakota

Viva la South Dakota cars. — Ed.

Sam Hanks

winner of 1957 Indy 500 says

**"The MIGHTY MOSS 1/4 MIDJET
handles like an Indianapolis winner —
really gets out and GOES!"**

"Your youngster will learn good sportsmanship and safe driving principles while enjoying the thrill of competition."

1/4 Midget racing is rapidly becoming America's fastest growing family sport. It creates a wonderful son-dad, mother-daughter relationship. The Moss Midget combines modern European styling with Indianapolis race car handling.



Check these features...

- Torsion bar adjustable front suspension • Rack and pinion steering
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- ALSO AVAILABLE—the 1958 Moss 1/2 Midget for youngsters and teenagers—even Dad can drive it comfortably.

FREE!

Write today to Sam Hanks for autographed 1957 Indy racing photograph and illustrated brochure on the 1/4 and 1/2 Moss Midget.

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NOTE: Continental Motors does not build quarter-Midget race cars, but for the best, choose one with Continental Red Seal power.

Continental Motors Corporation

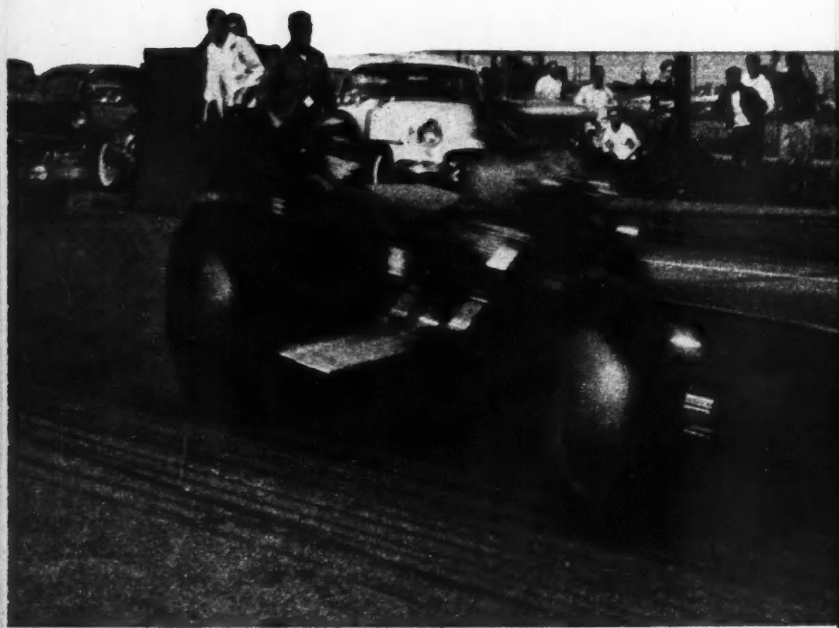
AIR-COOLED INDUSTRIAL ENGINE DIVISION

12800 KERCHEVAL AVENUE • DETROIT 15, MICHIGAN



What does it take
to go out to the drags and turn

157.61 MPH
On Pump Gas



ONE OF SEVERAL drag strips located within Los Angeles county is located in San Fernando. At the beginning of the year, the track speed record there stood at a very respectable 146.81 mph—especially so, when you consider that as a safety precaution, gasoline is the only fuel allowed at this strip. The car that set the record was Kenny Lindley's "Miss-Fire II," a blown Chrysler dragster chauffeured by Don Little.

Less than two months after this impressive time had been turned, the record was bumped

up to 147.54 by a group that was classed as relative newcomers—the team of Harryman, Frank and Brown. A week later this combination became the boys to beat on top speed at the LADS strip in Long Beach by turning 149.75, thus giving fair warning that the long standing goal of 150 mph on gas from a single-automotive engined car was about to be attained.

Showing admirable consistency, once again on the following week-end, Harryman, Frank and Brown returned to San Fernando and uncorked a run of 152.28—shattering the 150 barrier as if, indeed, it didn't even exist.

Pausing two weeks this time, in order to pull down the engine and gear-up the blower a little more for some added boost, they came back to San Fernando with the intention of breaking 155—and, by this time not too much to anyone's surprise, proceeded to do so at 157.61 mph.

Now setting their sights at 160, a speed they may have already achieved by the time this appears in print, Dick Harryman, Nye Frank, and Mickey Brown shatter much more than mere records. Even more important, they destroy the myth that records are broken only by the older, wealthier, and more experienced hot rodders, usually with considerable financial backing and engineering know-how contributed by speed equipment manufacturers.

Dick Harryman, who is 21 years old and works in his father's radio-TV repair shop in Pacoima, California, certainly can't be considered old, and has yet to claim being wealthy. Experience, though, is something he can't deny, having been drag racing Oldsmobile-powered rods of one description or another since old enough to acquire a driver's license. Dick is responsible for building up the supercharged Olds that powers the three-way partnership's dragster.

Nye Frank and Mickey Brown, who built up the chassis for the record breaker, are both 20. Nye is an aircraft assembler, while Mickey manages a Mobil service station. Once again there's no obvious amount of wisdom stemming from sheer age, but experience, like Dick, is something both these boys have, too. Although they built only one other significant drag machine before tackling the present project, it's still being talked about out in San Fernando Valley. It was a fuel roadster,

BELOW • On its way to another record-breaking run, the Harryman, Frank and Brown blown-Olds powered gas dragster departs from line in its typical fashion. Team holds records at three major So-Cal strips; with all speeds concerned over 150 mark.



Photos by Al Palocz

157.61 MPH On Pump Gas

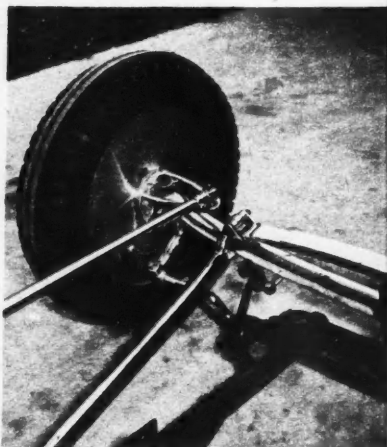


Spider-like in appearance, dragster weighs no more than you'd think — 1620 pounds. Frame is 2 1/4" diameter, .060" wall #1020 steel tubing, built by Itow's Automotive.

powered by a flathead Mercury, that attained a top quarter-mile speed of 128 mph on the Saugus strip — a good time in anybody's book.

The all-powerful sponsor lurking in the background with checkbook at the ready, found in the conventionally accepted portrayal of a record breaker, is another factor that's missing with this trio — sure, they've had help, expert advice; but the people who made the pistons, cam, magneto and blower set-up for this engine would like to see all the rest of their customers go just as fast; and are ready, willing and able to give comparable assistance to any of them who are equally keen and eager.

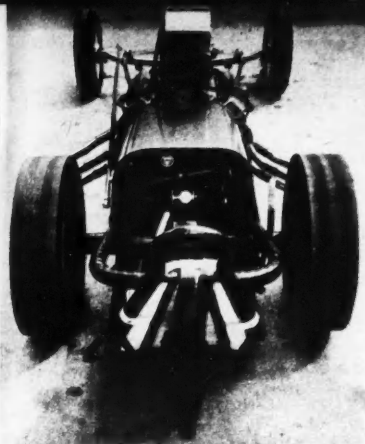
Harryman, Frank and Brown are doing more than just set records — they're restoring the hope of the "little guy" in drag racing that someday, he too may "go fast."



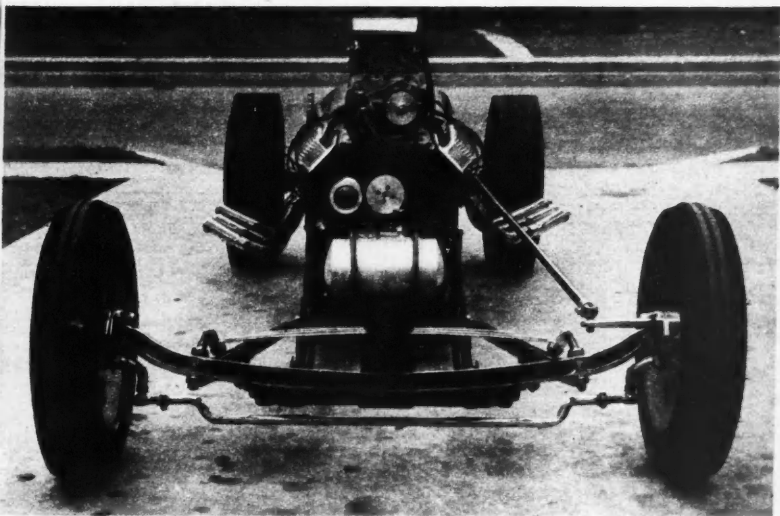
Coming Next Month
COMPLETE ENGINE ANALYSIS
OF THE HARRYMAN, FRANK
& BROWN DRAGSTER—BY
DON FRANCISCO

Dropped tie rod enables conventional spindle positioning to be retained, improving front-end geometry. Bell steering arm directs '46 Ford spindles through rigid drag link. Balance of front end is '46 Ford.

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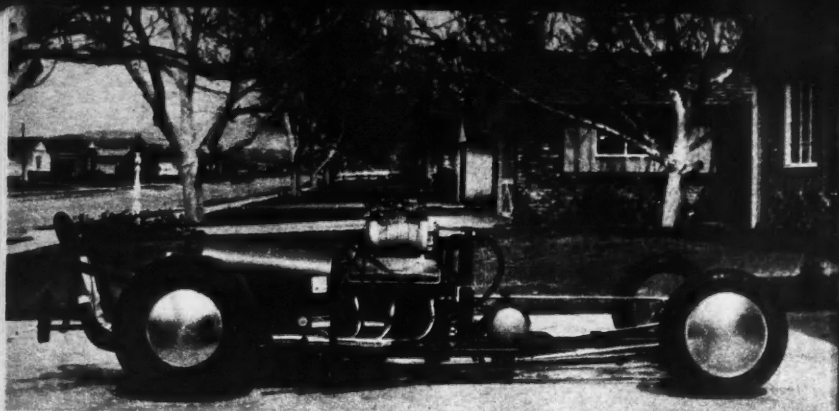


Driver Mickey Brown sits astride '48 Ford rear-end carrying 3.27:1 A. J. Getz gears. Franklin steering provides needed quick response. Differential action is retained as a safety feature, backed-up by incorporation of a set of "SP" safety hubs — just in case.



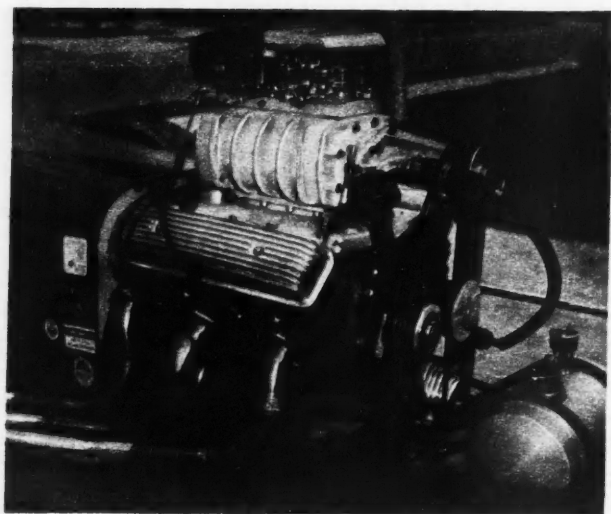
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Truck tie rod ends were used to mount the wishbones to the frame. Early model spring perches welded to wishbone mounting bolts carry special 3-leaf transverse spring. Unusual looking tires are Firestone dirt-track racing models ground down to 2-rib pattern.



Additional stiffening members above and below main frame tubes counteract inevitable dragster tendency to bend in the middle under full-bore acceleration. Low pivot point for wishbones preserves proper caster angle even with the frame front end lifted up.

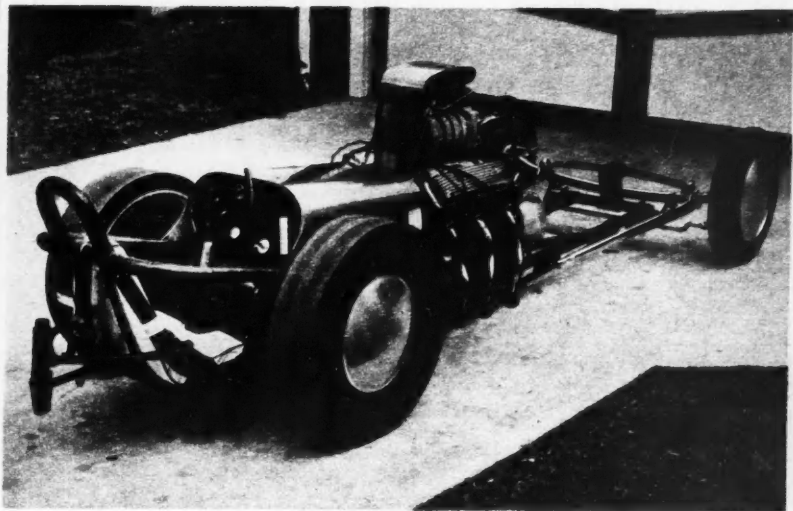
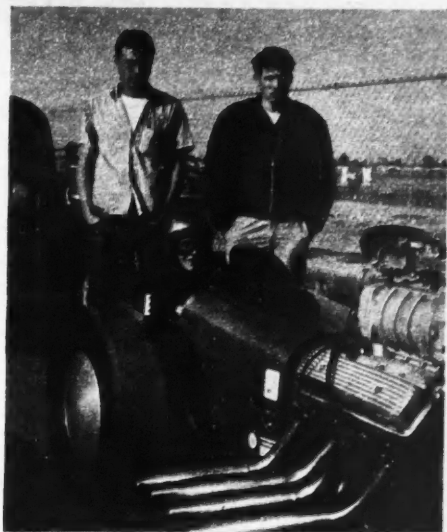
157.61 MPH On Pump Gas



The cause of it all is Dick Harryman's 406 cubic inch '57 Olds. Bored $\frac{3}{16}$ " oversize and retaining the stock stroke, the cylinders are filled by the Tom Beatty-converted GMC 4-71 blower. Carburetion is handled by dual '58 Pontiac Carter 4-throats. Ignition is by a Joe Hunt modified Scintilla-Vertex magneto (hidden behind blower here). Camshaft is an Engle #95 ground on a steel billet to allow higher spring pressures and rpm.

Simple
and with

Nye Frank, left, and Mickey Brown, (in car) both hail from Venice; built the dragster as their second joint project. Dick Harryman, right, installed his engine in the dragster after it powered his '50 Olds to 116 in the quarter, feeling that the coupe's limit had been reached.



Simple body is hand-formed sheet aluminum, finished in bronze lacquer. Moon fuel tank and wheel discs add functional good looks. Rear tires are 8.00 x 15 Firestones capped with Inglewood slicks and mounted on wide-base Lincoln rims. Brakes use Ferodo lining.

ACCESSORY OF THE MONTH



'55-'56-'57 CUSTOM TUBE GRILLES

ready to install for



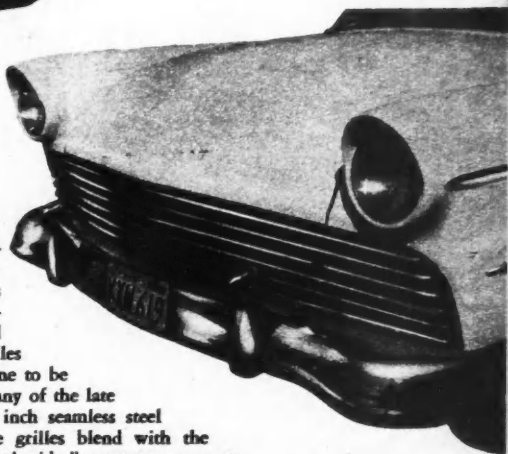


First step with any of the three models is the complete removal of the stock grille assembly including directional/park lights.

FORDS

Photos by George Barris

LAATEST IN GLAMOUR grille stylings are these dramatic "ready-to-install" tubular bar grille assemblies for all '55-'56-'57 Ford models. Manufactured by California Custom and designed by George Barris, the grilles are the first of a new custom grille line to be manufactured by "Cal Custom" for many of the late model cars. Made from three-quarter inch seamless steel tubing and triple chrome plated, the grilles blend with the cavities beautifully achieving the "low n' wider" appearance so popular with current custom car styling. Since the stock grille assemblies of all models listed are completely discarded, including parking and directional lights, a new set of park lights are included with each grille kit to be installed in the grille cavity's rear paneling. The '55 and '57 grille assemblies are truly bolt-on units. The '56 Ford installation requires a minimum amount of work in filling a few bolt holes remaining in the bumper pan and lower fender paneling once the stock grille is removed. This is thoroughly explained in the following step-by-step photo story. Cost of these new grilles are '55 and '56 Fords - \$34.95, '57 Ford - \$29.95. For additional information write: California Custom, 1807-cc West 65th Street, Los Angeles 47, California.



'55-'56-'57

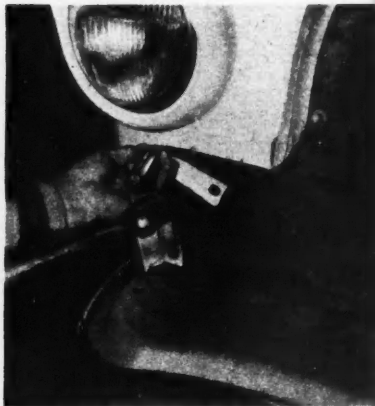
CUSTOM TUBE GRILLES

FORDS

ready to install for



1. Once grille is removed on the '56 Ford the lip of the inner top pan is trimmed off as shown. Not necessary on '55-'56.



2. Just under the lip of the grille on the '56 model and off to either side, the small attachment flange must also be trimmed off.



3. First grind paint from holes to be filled, then countersink each hole slightly with oversize drill. Holes are brazed closed.



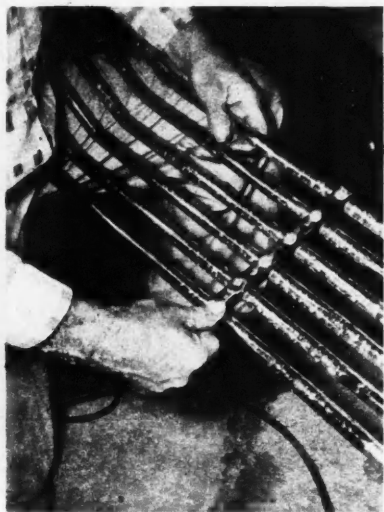
4. After the holes are brazed closed, first file surface with vixen file. Next, sand paint, prime, then blocksand to perfection.



5. Small accessory lights included in each grille kit are installed in cavity's rear paneling for park and directional lighting.



6. Grille kit's vertical bracket used for attaching assembled grille bars is now bolted into position at rear of grille cavity.



7. All chromed tubes are now assembled on to vertical tube brace and tightly secured. Complete unit is then positioned in grille.

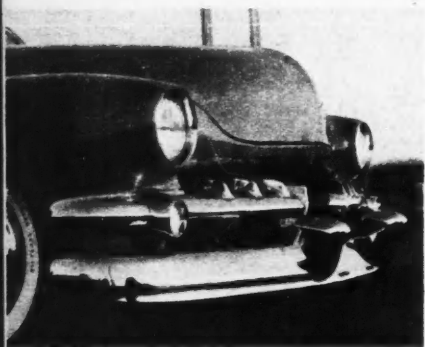
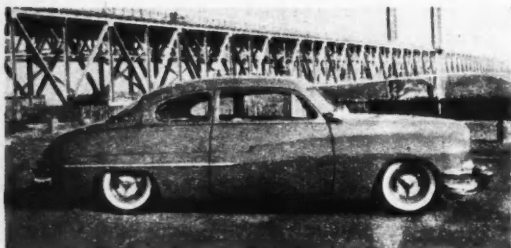


8. Last step is that of bolting the tube assembly to vertical brackets positioned in cavity. Align tube assembly, then secure.

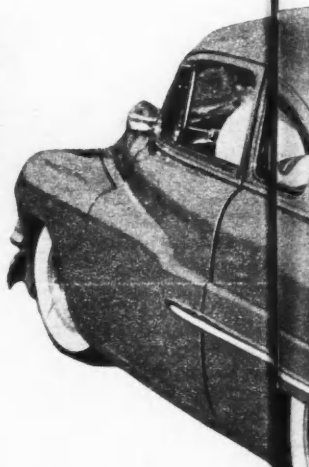
*Attaining membership in the Tacoma
Toppers isn't easy, but Jerry Harris'
Merc finally*

MADE THE TEAM

The "Tacoma Toppers" car club of Washington boasts of many fine custom creations one of which is this beautifully styled '50 Merc; belongs to member Jerry Harris. Herman Datchet of Brus Buick did the metal work.



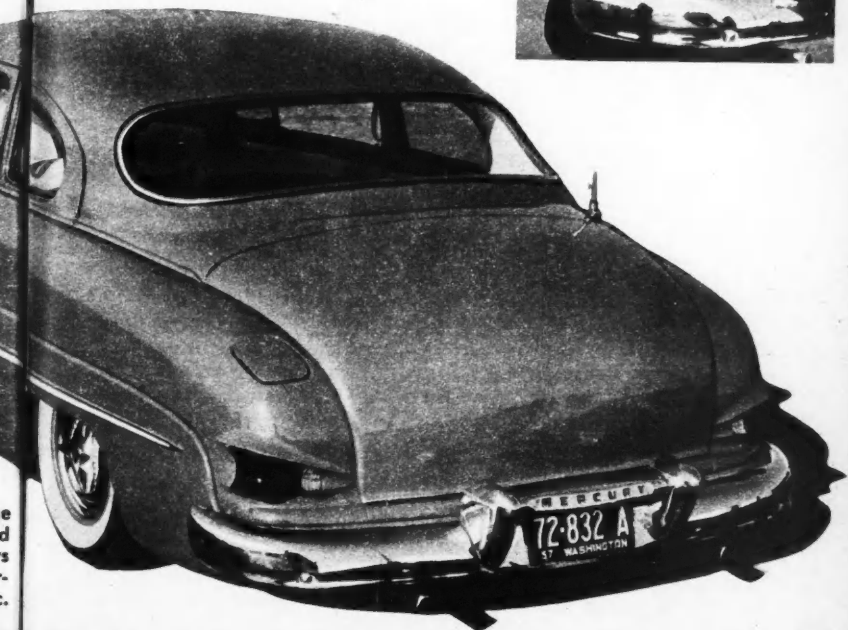
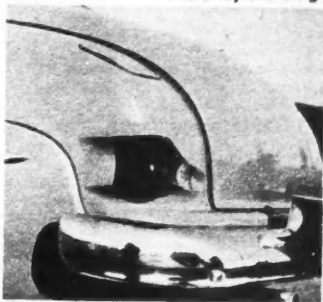
Grille features molded shell, '56 Dodge grille assembly. '53 Merc rims were used to french headlights. The hood displays rounded corner and slight peak. Power-plant consists of a warmed over '53 Merc.

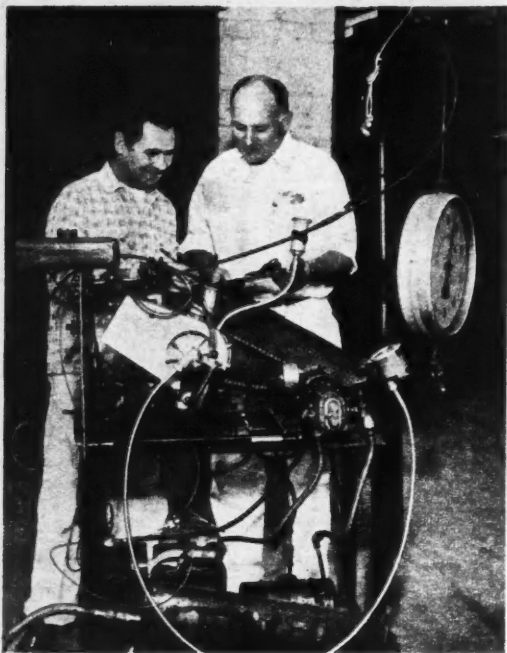




'57 Merc lenses have been neatly molded to fenders lending one-of-a-kind appearance. '55 Chev chrome carries side trim design. Club coupe has been dropped some five inches both front and rear. Doors and deck lid are operated electrically. Scalloping is planned for the Scottish Heather exterior paint. Contrasting red and white pleated interior is done by Thaden.

Photos by Bud Lang





QUARTER MIDGET

ENGINE SOUPING

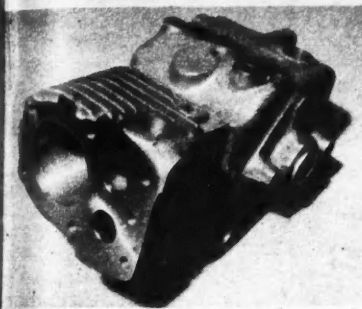
*CONCLUSION: Machine Work, Final Assembly
and Dynamometer Testing*

TEST AND PHOTOS BY DON FRANCISCO

CONTINUING ON where we left off last month, we'll delve into the methods used by Kong Jackson, of Jackson Engineering, Research and Design, to rework Continental Engines for Quarter Midget Racing. The first operation of the actual rebuilding is surfacing the top of the cylinder block to remove the original rough finish. This is done to give the head gasket a smooth surface on which to seat. Then the cylinder is bored to size.

The flange on the exhaust port is machined to make it smooth and then it is drilled and tapped with the aid of a special jig to enable a flanged exhaust pipe to be bolted to it, instead of screwing the pipe into the port. The jig used for this purpose aligns the bolt holes with the port so the exhaust pipe bolted to

the flange will match the port perfectly. The intake and exhaust ports are enlarged with a special reamer while the cylinder block is bolted to a jig attached to the cross feed of a lathe. The reamer is rotated with the lathe's chuck and it is aligned with the bolt holes in the ports' flanges. The top of the block is then drilled and reamed in two places with the aid of a jig that is bolted to the block by means of bolts screwed into two of the head bolt holes. Dowels, mentioned previously in the description of Kong's cylinder head, are then driven into the holes. The dowels are used to align the block on the jigs used for the rest of the machining operations. In this way the block is always in the correct position in relation to the tools used for the machining, thus



First step is reboring block to desired size, followed by surface grinding top to insure accurate alignment during other machining.

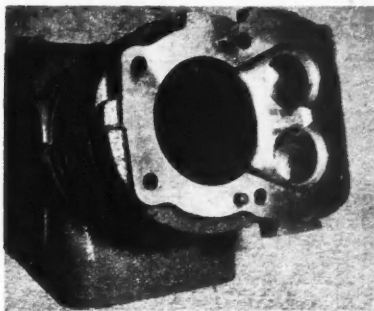
making sure the results are always the same.

With the block bolted to the jig on the lathe, but in a different position than for enlarging the side ports, the valve seats and ports are enlarged with the same reamer used for the side ports. The porting is finished by blending the reamed surfaces of the side and valve ports together with a portable grinder and small grinding stones.

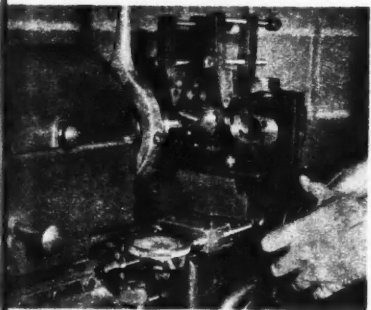
The top of the block around the valve seats and in the area between the seats and the cylinder is machined with an end mill. The shape and depth of the relieved area are controlled to within a thousandth of an inch to guarantee uniformity with the desired dimensions. Too much material out of this area will lower the compression of the engine and not enough will cause the breathing between the valves and the cylinder to be restricted. The relief is finished by grinding the point where

it meets the cylinder to a radius of approximately $\frac{1}{8}$ -inch. This removes the sharp edge in the combustion chamber, eliminating the possibility of the edges becoming over-heated and causing pre-ignition of the mixture in the cylinder, and it also makes it easier for the fresh mixture to enter the cylinder.

In many of these engines the valve guide bores are not in line with the tappet bores, as they should be. This causes the valve stems to be out of line with the tappets so that only partial contact is obtained between the lifters and the valves. Kong eliminates this condition in the engines he builds by enlarging the bores with a drill, which is held in line with the bores by a jig bolted to the top of the cylinder block, and then reaming the bores with a reamer of the correct diameter for special guides that are driven into the bores. The new guides are reamed after they have been driven into the block to make their bores



Finishing touch to relief is radius on edge of bore to prevent possible hot spot. Dowels remain in place to align the cylinder head.



precision fixture clamps block in place while end mill removes material for relief. Dowels are installed to assure accurate alignment.

straight and of the correct diameter. In addition to aligning the stems with the tappets, the new guides provide the advantage of allowing valves with $\frac{1}{4}$ -inch stems, instead of the stock $\frac{9}{32}$ -inch stems, to be used. The smaller stems not only allow the valves to be lighter but they also reduce the restriction they create in the intake and exhaust passages.

With the guides in place, the new valve seats are ground. This is done with a regular seat grinder guided by a pilot inserted in the valve guide. The stock 45 degree seats are retained for both the intake and exhaust valves and the seats are finished to a narrow width to match the faces on the special valves. With the exception of a thorough cleaning, the block is now ready to be assembled.

Kong uses two types of connecting rods in

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ENGINE SOUPING

quarter midget

his engines. One of these is a stock rod that he modifies so its big-end can receive more oil and the other is a special rod that is machined from solid 7075-T6 aluminum. The special rod is called the "Golden Rod" because of its gold colored anodized finish and it is fitted with a bearing insert that has cadmium-silver bearing material. A Golden Rod weighs approximately 5 ounces in comparison to the 4½ ounces of a stocker. It costs \$12.95, complete with bearing inserts, and replacement inserts can be bought for \$2.50. The price of the rod includes a special oil dipper. Reworked stock rods are used in mild engines and Golden Rods are used in hotter versions.

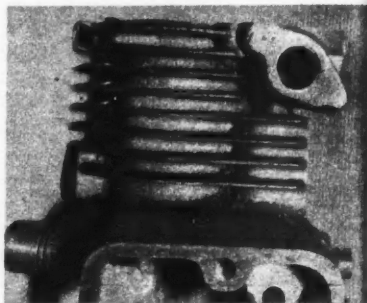
Modifications to a stock rod consist of milling four radiused slots in each side of its big-end so oil can flow onto its bearing surfaces and the crankpin more easily. The slots are approximately ⅜-inch wide and about ⅝-inch deep at their center. Two of the slots on each side of the rod are on the parting line between the rod and its cap and the other two are between these so that one is in the rod and the other is in the cap.

The stock .120-inch diameter hole in the top of the big-end is chamfered so oil may enter it more easily and a similar hole is drilled in the opposite side of the big-end. An additional hole is drilled in the piston pin end of the rod so oil can flow to the surface on which the pin seats. When the rod is installed in the engine the oil hole in its pin end is placed on the high side of the cylinder so that oil that collects on the top of the pin boss can flow into the hole.

The bearing bore in the rod is lightly scraped to remove a coating of some kind that is on all stock rods. The scraping increases the clearance between the bearing and the crankpin to .0045 to .005-inch. Removing the coating seems to lengthen the life of the bearing surface.

The stock cap bolts in both stock rods and Golden Rods are replaced with hardened socket-head Allen bolts. The bolts have a shoulder next to their head that positions the cap on the rod so the bearing bores in the two members align correctly, and the threads on the bolts are long enough to use all the threads in the rods, reducing the chance of stripping the threads out of the rods.

The bores in the piston and connecting rod are sized for the piston pin by lapping them with a special lapping tool. Fine grade lapping compound is applied to the tool and it is rotated in a drill press. The bores are lapped until the pin fits in them with a light thumb



Stock threaded exhaust port is inadequate for competition use. Provision must also be made for installing new exhaust piping.

push fit. Lapping the bores in the piston in this manner guarantees their accurate alignment so the pin won't bind at any point.

After the pin has been fitted to the rod, the rod's alignment is checked on a special fixture that consists of a vertical plate mounted at an exact 90 degrees to a base plate. Attached to the face of the vertical plate is a pin on which the big-end of the connecting rod can be clamped. The surfaces of the pin are on a 90-degree angle to the vertical plate. The rod is checked for a bent condition by clamping it to the pin on the fixture so it is held in a vertical position and then, with the piston pin in its bore in the rod, measuring the distance



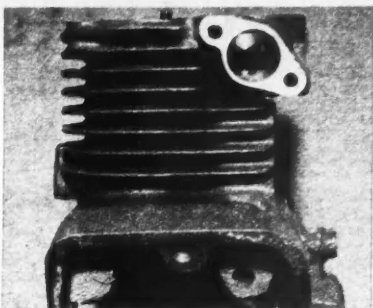
Another portion of special tooling developed by Kong is used to bore out exhaust ports to larger size consistent with higher rpm, actu-

from the base plate to the pin on both sides of the rod. When the rod is straight the measurement is the same on both its sides. Corrections for a bent condition are made by supporting the rod's shank on a pair of large steel dowels on the base of a press and then exerting pressure on another dowel on top of the shank to bend the shank in the correct direction. Using dowels to support the rod and to transmit the pressure of the press ram to the rod eliminates the possibility of making sharp-edged marks that might be starting points for cracks on the surface of the rod. The rod is checked for a twisted condition by supporting it on the plate so it is in a horizontal position and then measuring the distance from the base plate to the pin at points on both sides of the rod. Any twist in the rod will make the measurements vary. So far none of the rods have been found to be twisted so no effort has been made to devise a safe method for correcting such a condition.

After the rod has been straightened, the piston is mounted on it and alignment of the piston checked to be sure its pin bores are at right angle to its skirt. This check is made by mounting the rod and piston assembly on the fixture so the rod is in a vertical position and comparing the alignment of the side of the piston's skirt with the vertical blade of a square supported on the fixture's base plate.

Correct connecting rod alignment is important in any engine because when a rod is bent the skirt of its piston is held at an angle to the cylinder wall and the big-end of the rod is cocked on the crankpin. Holding the piston on an angle causes its skirt to drag on the cylinder wall, creating unnecessary friction between the piston and the wall and throwing the rings out of alignment with the wall. In an engine as small as this the friction created in such a manner could materially reduce its crankshaft speed and horsepower output from what they should be. Locking the big-end of the rod on the crankpin could also cause unnecessary friction but the most disastrous result of such a condition would be seizing of the rod on the pin and the destruction of the rod's bearing surface.

The Grant piston rings Kong uses are made especially for use in quarter-midget engines and they seem to do an extremely good job. The rings are checked in the cylinder to determine whether they have adequate gap before they are installed on the piston. This is done by inserting a ring in the top of the cylinder and then pushing it into the cylinder with the head of the piston. The piston skirt squares the head with the wall and the head squares the ring. It is important that the ring be square with the cylinder wall when the gap is checked because if it isn't the gap will measure more or less than it actually will be when the ring is on the



After boring-out, contours are blended in with hand grinder. Exhaust flange is surface ground; tapped holes added for new pipe.

piston. Kong uses a gap of .012-inch and if the gap weren't wide enough he would file the ends of the rings until it was; however, so far he hasn't had to file any of the rings he has used. The filing would be done by mounting a small fine-cutting file in a vise and then moving one end of the ring along the file until sufficient material was removed.

Adequate end gap is important because if it is less than it should be the ends of the ring will butt together when the ring warms up after the engine is started. When the ends butt together there is no place for the rings to go but out, where it is restricted by the cylinder wall. Then, if it continues to expand, the ring buckles inward and breaks. A broken ring in an engine is worse than no ring at all.

The outer circumference of each ring is inserted in its respective groove in the piston and the ring is rolled around the piston to be



Intake port receives similar modification, but surface-grinding of flange and tapped holes were done at the Continental factory.

ENGINE SOUPING

quarter midget

sure it doesn't bind at any point in the groove. The rings are then expanded and slipped over the head of the piston and down to their respective grooves. Care is taken when expanding the rings to not open them so far that they are damaged or broken. If a ring should be distorted when it is being installed on the piston it may not seal as it should.

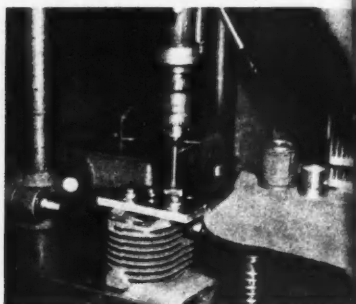
All that remains to be done now is to assemble the engine. Kong starts the assembly by installing the valve lifters, camshaft, and the valves and their springs. The valve lifters are installed by inserting them in their bores from the inside of the crankcase. Then the camshaft is slipped into place, with its end that is drilled for the distributor drive pin next to the bottom of the case, and held in place with a dummy ignition shaft inserted through the ignition shaft opening in the crankcase. A dummy shaft can be made for this purpose from a length of $\frac{3}{8}$ -inch diameter round steel stock.

With the camshaft positioned so the valve lifters are on the heel of their cams, the valves are inserted in their guides and the clearance between the ends of their stems and the lifters is checked with a thickness gauge. The clearance is always less than specified when Kong's valves are used because the stems are left extra long so they can be used with a reground camshaft. When cams are ground, material is removed from their heel, which allows the lifters to drop lower in their bores than they can with stock cams. The corrections for this are longer valve stems or lifters.

The factory specified valve clearance for engines with a stock cam is .014-inch for both valves but Kong sets them at .009-inch for the intake and .010-inch for the exhaust. Setting the valves a little closer in this manner causes them to be opened just a little earlier and to close a little later than they would with stock clearance. The closer clearance doesn't seem to have any effect on valve life so it must be adequate. If a reground cam is installed in the engine the lash is set to the clearance specified by the grinder of the cam.

The clearance is adjusted by shortening the stems by grinding material from their ends, or by removing the material in a lathe. If the clearance were less than it should be it would be necessary to either install valves with longer stems, reface the valves to remove enough material from their faces to let them sit lower in the block, or grind the seats deeper into the cylinder block.

When the clearance is correct, the valve springs are installed with their special retain-



Valve guide bores are reamed for precise fit after being bored-out to accept special guides fitting the Kong small-stem valves.

er washers and split locks. The special springs Kong uses are stiffer than stock springs; they can force the valve and lifters to follow the cams as they should. Spring tension is critical in these engines because although it must be great enough to close the valve properly at high engine speeds, it must not be so great that it will overload the cam lobes and the gear on the camshaft. If the load exerted by the springs is too great the lobes will be worn excessively and it is possible the teeth on the cam gear will be worn excessively or some of them broken. Ed Winfield recommends that the springs used with



Piston pin bore is lapped to exact fit to fit particular pin to be used in each individual engine. Proper clearances are imperative.

reground cams have a tension not greater than 55 pounds when the valves are open. This rule should apply to any cam one might use, and it is important that special springs be used only with special spring retainers and not with stock retainer washers and pins. At a length of .800-inch, with the valves open, Kong's springs have a tension of 40 pounds.

After the valves have been installed, the crankshaft is slipped into the block so it can be used to turn the camshaft to lift the valves to their full open position. The purpose of doing this is so the valve springs can be checked to determine whether their coils touch when the valves are open. The coils must not touch and if they do it will be necessary to make corrections to increase the installed length of the springs.

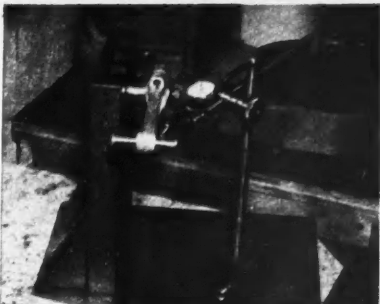
The crankshaft is installed next by inserting its flywheel end through the bushing in the block and meshing the notched tooth on its camshaft driving gear with the marked teeth on the cam gear. The shaft is pushed into the bushing far enough for the thrust flange next to its cam gear to seat on the flange on the inner end of the bushing in the housing. The inner reduction gear housing, with its bearing and gasket, is slipped over the end of the shaft and bolted temporarily to the cylinder block so the endplay of the shaft can be measured.

Enough crankshaft endplay must be provided to enable the shaft to rotate freely when the engine gets hot but it must not be so great that the shaft can slop back and forth because end movement advances and retards the valve and ignition timing, causing engine performance to be erratic. The endplay is controlled by steel shim washers that are installed on the crankshaft between the thrust surface on the gear end of the shaft and the inner gear housing and it is adjusted by adding or removing washers.

The specified endplay is .006 to .009-inch, preferably .009-inch for a hot engine. It is measured by holding the crankshaft against the flywheel side of the block and then inserting the blade of a thickness gauge between the thrust surface on the reduction gear end of the shaft and the shim washers. If the desired .009-inch clearance cannot be obtained, juggling the washers on the crankshaft, additional gaskets can be installed between the gear housing and the cylinder block.

The heads of the four capscrews that hold the inner portion of the gear housing to the block are drilled so they can be locked together in pairs with safety wire. It is important that the bolts inside the housing be locked securely to prevent their coming loose and being caught between the gears.

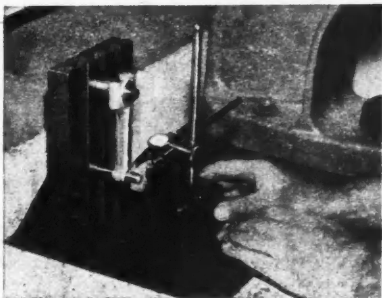
Next to go into the block is the piston and connecting assembly. The cap is removed from the cylinder and then the rod and piston are lowered



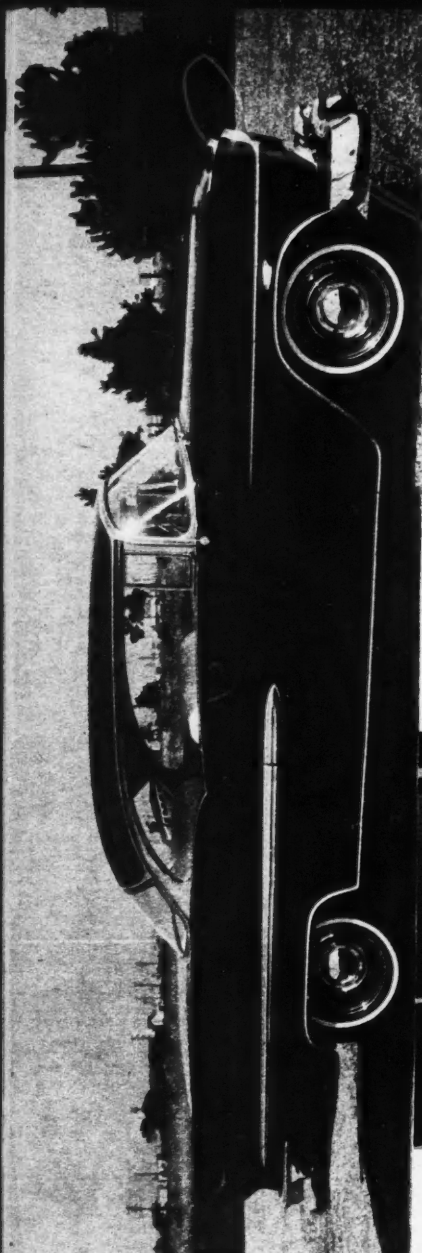
Although Kong has yet to find any twist in Continental rods, each one is checked out in this special fixture before the assembly.

into the cylinder. The rings are compressed carefully so they will enter the cylinder without being damaged. Special care must be taken with a relieved block because the rings must be held in a compressed position until they are past the relief.

The piston is pushed into the cylinder until the rod seats on the crank-pin and then the cap is installed on the rod. There is a small raised boss on one side of the cap that must be in line with a similar boss on the rod when the cap is on the rod. This is important because if the cap is installed incorrectly the bearing bore in the cap won't be in line with the bore in the rod. The dipper is installed on the cap with the cap bolts so its long side is on the low side of the rod. The bolts are pulled up tight but not so tight that they strip the threads out of the rods. Aluminum isn't too tough as far as



Rod is checked for bent condition on this fixture by verifying parallelism of big and small ends. Dial gauge insures accuracy.



'55 Chevs are a stylish package, but Elwyn Carlson wanted just a

LITTLE BIT MORE

Photos by George Barris

Ward's Body Shop of Alameda, California came up with the solution to Carlson's desire to have his Chevy stand out from the rest. Simple styling proved most effective



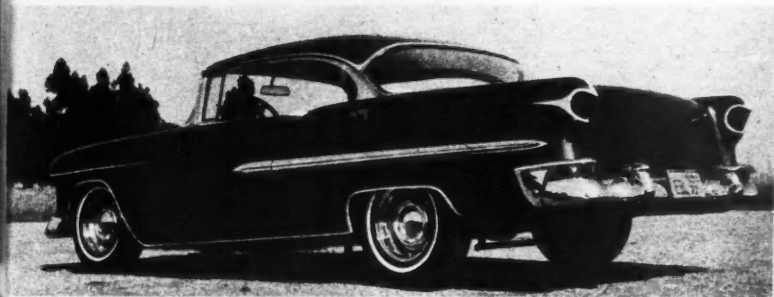
White Naugahyde interior carries pleat and roll theme throughout. Custom floor rug and Cut-are in a contrasting dark green. Lee's Auto Upholstery did work. Note Corvette shift from



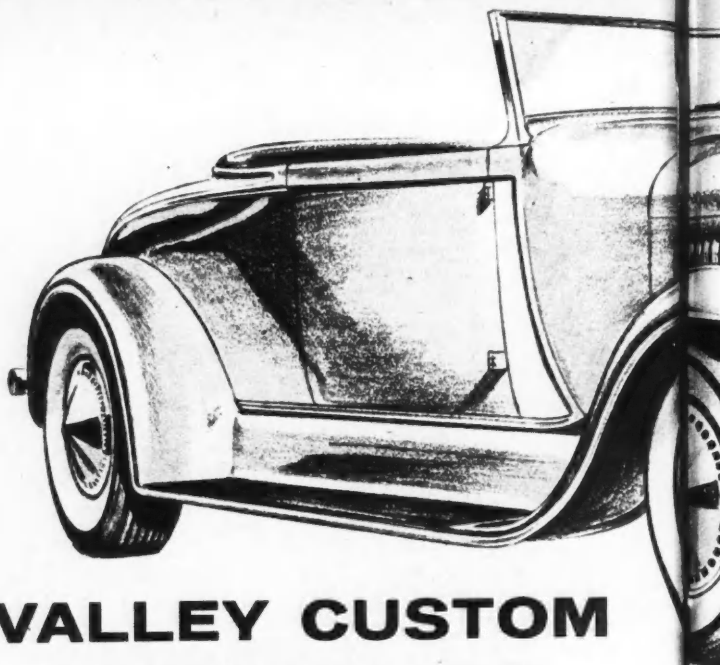
Removal of vertical chrome strip gives remaining trim a custom look. Shaved doors add to effect. Narrow whitewalls draw attention to chrome reversed wheels.



Complete grille from a '56 Corvette fills-out stock cavity. '55 Olds headlight rings blend with frontal design. Functional air-scoops cut in abstract manner.



Cut-down '56 Chrysler taillight lenses, set in reworked fenders, take on a "beak-like" appearance. Shaved deck, doors and Cadillac aerial operate electrically. Cut coils up front, lowering blocks at rear gave car definite "rake." "Tommy the Greek" did scallops.



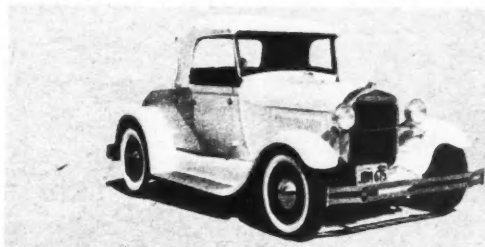
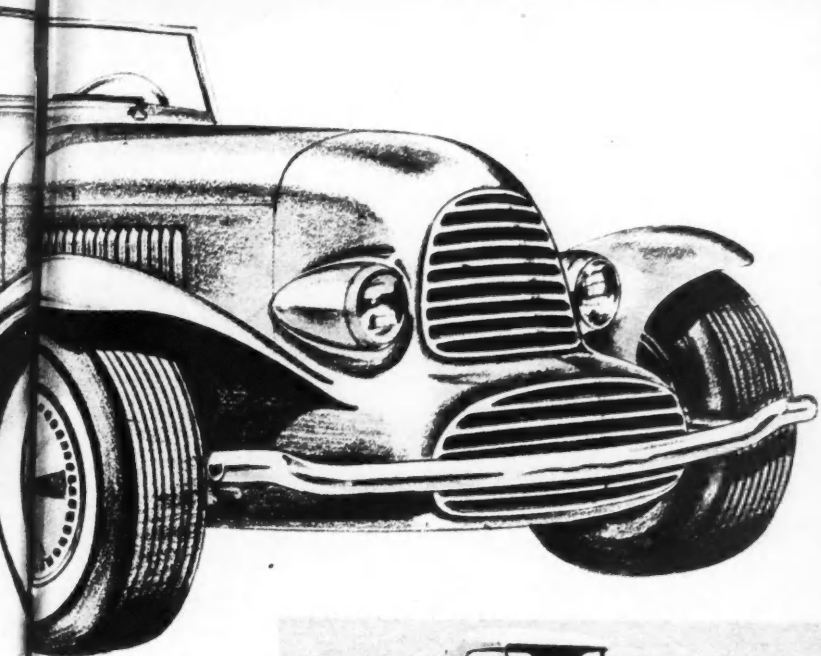
VALLEY CUSTOM RESTYLES the Street Rod



Neil Emory



Clay Jensen



THE ANCESTRY AND backbone of the vast hot-hodding sport can be traced directly to the street roadster. Originally, the prime objective was to make them go faster. Part of this gain in speed was attained by stripping everything removable from the cars, even to the extent that sometimes all that was left was the engine, chassis and perhaps an apple box for a seat. This was great for go but style-wise and comfort-wise it left quite a bit to be desired. As the sport progressed there was a noticeable change in the cars that were also being used on the streets rather than strictly for competition. Perhaps the protruding taillights were replaced with more compact lights and the bulky headlights replaced with the smaller, modern seal-beam lights. Thus we had the birth of the *custom street rod*.

As there has always been a great deal of interest inspired by these little jewels, we decided to find out how a modern rendition of the popular '29 'A' would appear, when the capable hands of Neil Emory and Clay Jensen, co-owners of the Valley Custom Shop, got through with it. Staying within our mythical budget of \$1,000., they came up with what we believe to be an outstanding example of present-day street rod styling.

BODY MODIFICATIONS

Neil and Clay agreed that they should retain the classic American roadster look but flavor it with a touch of foreign race car styling. So, actual modifications to the body were kept to an extreme minimum. The first thing to go was the gas tank filler neck. It was cut off flush with the cowl and the hole filled in. This naturally necessitated installing a gas tank in the trunk compartment. Feeling that the cowl should appear as one solid piece of metal, they frenched-in the cowl seams. Keeping with their clean-up campaign, they removed the door handles and filled the holes. To provide better handling as well as a lower silhouette, the car was lowered. This was accomplished by installing a "dago" axle in front and reversing the eyes on de-arched springs at the rear.

FRONTAL CHANGES

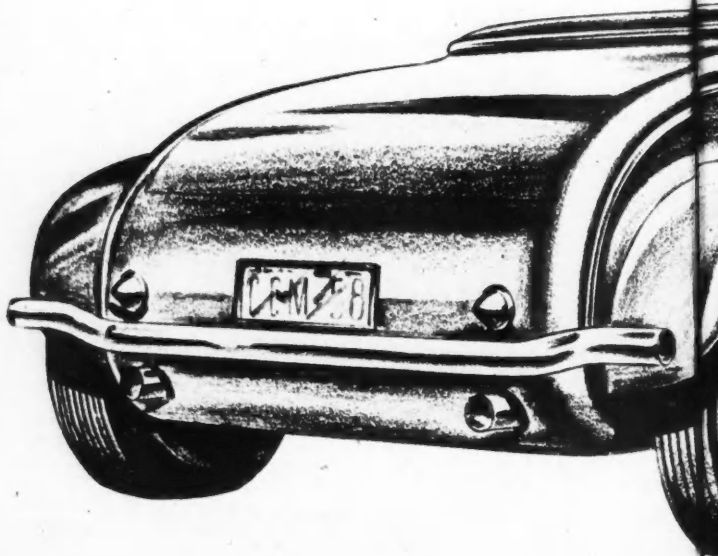
Neil felt that the front end should receive the major share of alterations. Clay agreed, adding that this is where the foreign aspect should be introduced to the roadster. Together they designed a unique grille shell that extends considerably past the normal radiator position. The two separate grille cavities were filled out with grille pieces hand-formed from chromed round rod. For headlights they selected the '39 Chevrolet units — frenching them to the sides of grille shell. Sticking to the foreign theme up front, they bobbed the fenders so that the leading edges flowed forward to the grille shell.

REAR ASPECT

Being avid believers in balanced customizing, Neil and Clay bobbed the rear fenders to align with the frontal styling. Feeling that the

RE STYLING

the Street Rod



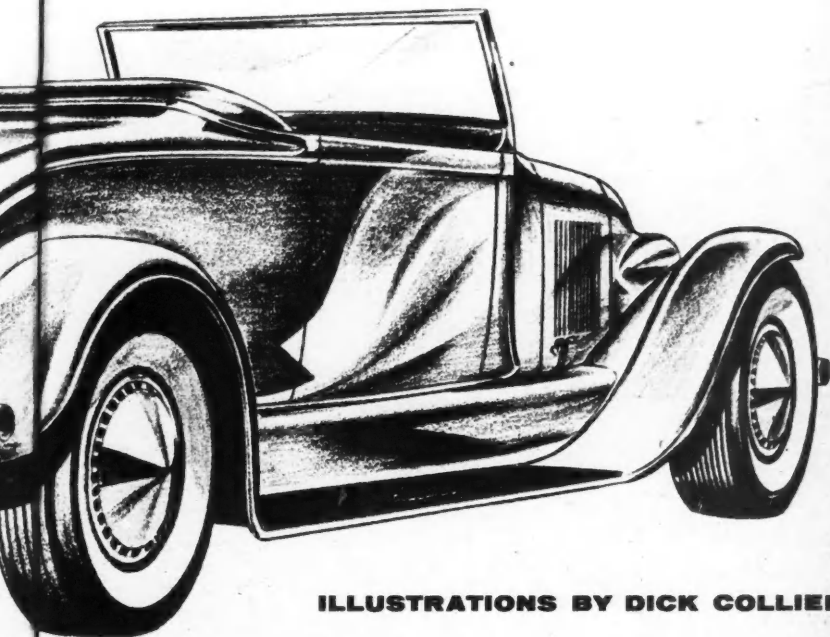
rear panel on a stock 'A' ends too abruptly — they rolled a complete new tail panel which starts below the deck lid and runs down beneath the car. This change provided a perfect setting for the license plate and '53 Buick taillight lenses. They also routed the exhaust tips through the lower section of this panel.

DETAIL

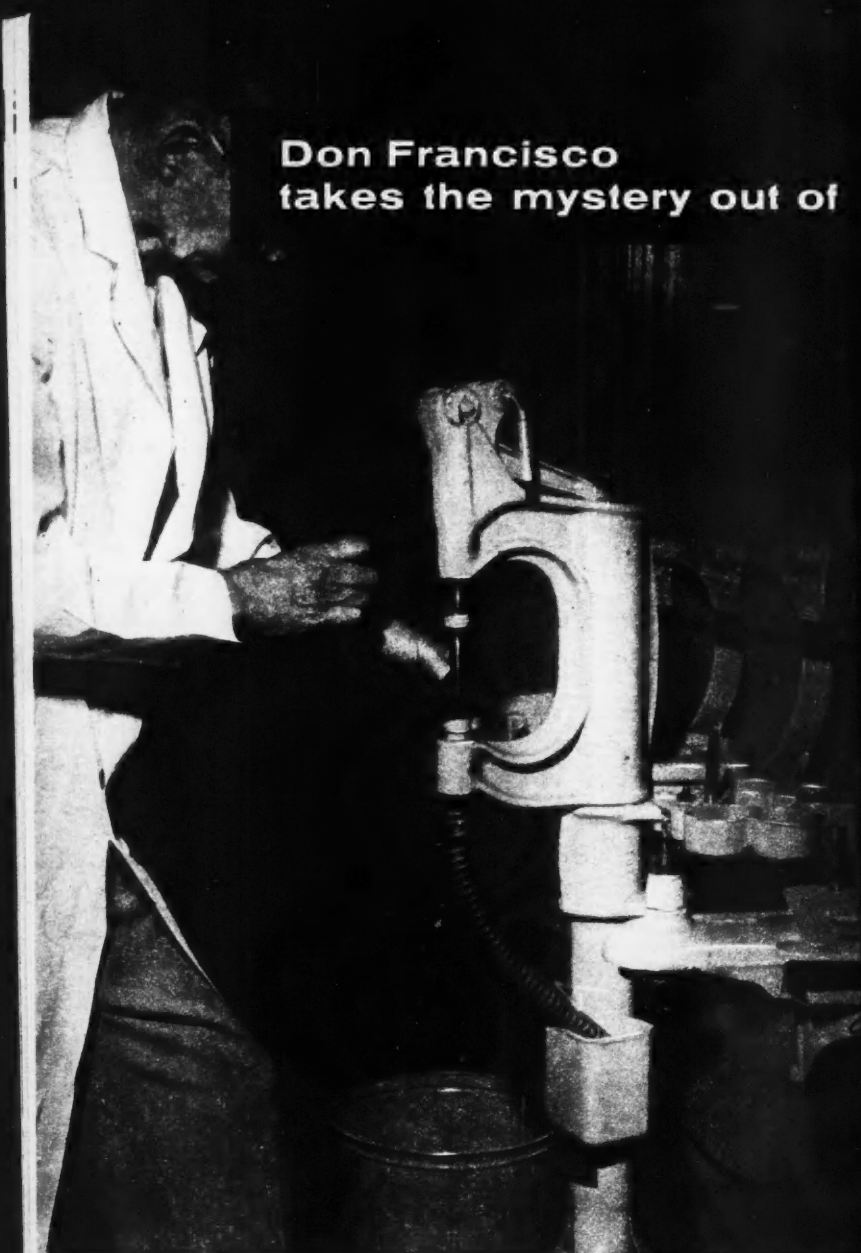
Knowing of no stock bumpers that would blend with the roadster's new styling, Neil and Clay built their own. They selected 2½" diameter, thick-wall tubing which they bent to match the car's contour. The ends were cut off to the same width as the outer sides of the tires. After capping the open ends, the bars were given the chrome treatment. Rather than pick a particular color of their own, the Valley Custom Shop left the choice up to the individual reader's discretion.

PARTS AND PRICE LIST

	LABOR (Parts included)
Fill door handles	\$ 10.00
Fill gas filler neck and trunk seal seams	85.00
Build grille shell, grille and mount headlights	385.00
Reb fenders (front and rear)	100.00
Build bumpers	90.00
Roll tail panel and install taillights	100.00
Lowering (front and rear)	75.00
Paint car (material included)	150.00
TOTAL	\$795.00



ILLUSTRATIONS BY DICK COLLIER



**Don Francisco
takes the mystery out of**

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BRAKE SERVICING

THE HYDRAULIC BRAKES on your car are tough customers. They take a beating every day that few other parts of a car could take without giving up, and they can take this beating for a long time. But despite their toughness, brakes are not immune to wearing out and when they do they must be properly serviced if they are to be restored to their original effectiveness.

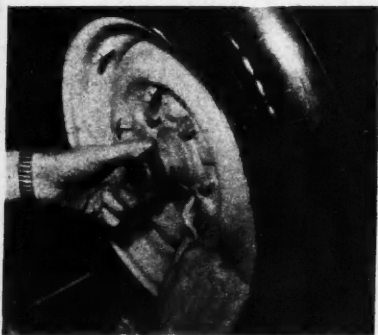
As it is impossible in an article such as this to describe all of the many types of hydraulic brakes on the cars in use today, we shall describe the service procedures for the one that is the most popular at the present time. This is the Bendix "Duo-servo."

To get some of the photos and information for this article, we made our second trip to the classrooms of National Schools, in Los Angeles. National Schools is a trade school that has courses in automotive and diesel mechanics and radio and television. Mr. Frank Walbridge, one of the instructors in the automotive division, was kind enough to show us the procedure for dismantling and assembling one of the brakes on a Pontiac chassis in his classroom and then demonstrate

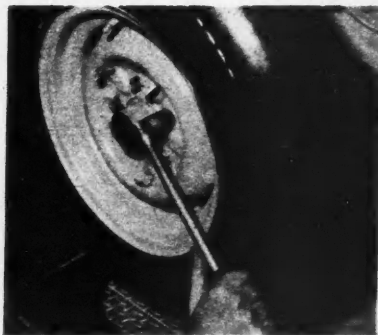
some of the overhaul procedures.

For service purposes a hydraulic brake system can be divided into two parts: the mechanical part and the hydraulic part. The mechanical part consists of the shoes and their lining, the drums, the emergency brake linkage, and the linkage that actuates the master cylinder. The hydraulic part consists of the master cylinder and wheel cylinders and the tubing and hoses that connect them. Members of the system that suffer the greatest wear are the linings on the shoes and the friction surfaces of the drums. Usually all that need replacing or reconditioning the first two or three times the brakes require servicing are the lining and the drums but after that the hydraulic system often needs at least minor repairs and possibly a complete overhaul to keep it in a safe condition.

The only part of a brake servicing job that should present any difficulty at all to the average home mechanic is the task of adjusting the shoes after the reconditioning work has been done. Special equipment is needed for installing new lining on the shoes and turning the drums, but a fellow can



First step is removing front wheel bearing dust cap. Versatile tool being used here is one you'll need, known as a "brake spoon".



Wheel must be separated from drum and hub assembly. Car used as example had left-hand threads on lug bolts and nuts.

BRAKE SERVICING

have these jobs done at any brake shop or auto parts store after he has removed the drums and shoes from the car. Removing the drums and shoes and then replacing them are purely mechanical motions but the adjusting is something else. Hydraulic brakes are a cinch to adjust compared to the mechanical type, but they still aren't easy if one is unfamiliar with them.

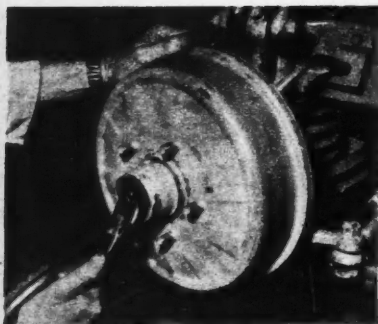
When the linings have been worn to the point where the rivets are within a thirty-second of an inch of their surface that contains the shoes, they should be replaced. Grooves will be worn in the drums if the rivets are allowed to hit them and if the grooves are deep enough the drums will be ruined. However, if the shoes have bonded lining there won't be any rivets to hit the drums, making it possible to use more of the lining before it must be replaced. Bonded lining is cemented to the shoes under heat and pressure, making it practically a part of the shoes. Replacement shoes with bonded lining are now available for most cars and they are recommended in preference to shoes with riveted lining.

Drums should be turned whenever the lining is renewed. There may be rare instances where this won't be necessary but usually the drums will be found to be scored, out of round, bell-mouthed, or suffering from combinations of these conditions; however,

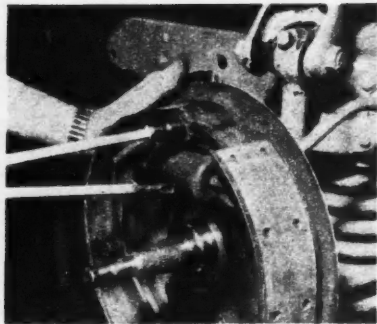
any one of the conditions is reason enough to turn the drums because the brakes won't work as they should if it isn't corrected. Drums can be safely turned only .100 of an inch or so (.050 of an inch on a side) and be reused, so the general practice is to turn them only enough to make them round and smooth again and then fit the relined shoes to them by grinding the lining to the same radius as the drums.

Drums should be reasonably smooth after they have been turned. If they aren't smooth they will wear the lining rapidly until the roughness has been worn off them. It isn't unusual in some parts of the country to see flexible-turned drums that look as though they had been cut with a wood rasp. A fellow shouldn't go to a shop that does work of this type, but if he should get stuck with such a job about all he could do would be to smooth the drums with emery cloth. Drums don't have to be polished but they should be smooth enough that they won't tear the lining.

An important and often neglected factor in a brake reconditioning job is the selection of the new lining. Too many times fellows will take their old shoes to a parts store, or to the parts department of the agency that handles their make of car, and exchange them for relined shoes without inquiring about the type of lining that is on the shoes they are



Remove cotter key from spindle nut, then take off nut. Pull drums, clean with compressed air. Inspect for cracks and scores.



For Pontiac, special factory tool is needed to remove upper shoe retracting springs. Spring for shoe closest to camera is off.

buying. Some fellows think that brake lining is brake lining and that's it, but such is not the case. There are many brands of lining on the market today and the manufacturer of each brand makes more than one type of lining. For all practical purposes these linings can be divided into two groups: soft and hard.

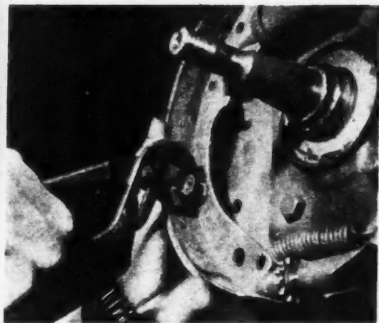
Lining used as stock equipment on most passenger cars is of the soft type. A soft lining is pleasant to use because it requires minimum pedal pressure to stop a car but this easy pedal is gained at the expense of lining life because such linings wear rapidly. Hard linings require more pedal pressure than soft linings to provide equivalent stopping effort but they compensate for this factor by having a much longer useful life. The type of lining to install would depend on the preference of the driver of the car, but it is almost certain that unless one specifies otherwise when exchange shoes are purchased, he will get a soft lining. This will be alright for the average driver but a hard lining would be more satisfactory for the fellow who doesn't mind the extra pedal pressure and who may drive a little harder.

The first step of a brake servicing job is removing the drums. Removing the front drums and their hubs is merely a matter of pulling the hub cap off the wheel, pulling or prying the dust cap out of the hub, removing the cotter pin that locks the hub nut to the spindle, removing the nut and its washer, and then pulling the hub and its bearings off the spindle. If the drums are to be turned, remove the wheels from the hubs.

The procedure for removing rear drums will depend on the type of axle shafts the car has. If the shafts have a flange on their outer end, pull the wheels and remove the flat "speed nuts" from the two or three wheel bolts that have them and then pull the hubs off the flanges. If the shafts have tapered ends and the drums have integral hubs, remove the nuts from the shafts, pull the wheels, and install a puller of the correct type on one of the hubs. Tighten the bolt in the puller until the hub snaps loose from the shaft. Pull the other drum in the same manner. Don't try to pull drums and hubs of this type without a puller because all you will do is damage the shaft and hub.

With the drum out of the way it's a simple matter to remove the brake shoes. However, before going to work on the shoes it is a good idea to install clamps on the wheel cylinders so none of their pistons and cups can fall out. Clamps for this purpose are available from most parts and tool supply stores. Also, you'll need a tool for removing the retracting springs from the shoes. There are several types of tools available for this purpose and most of them are made for installing as well as removing the springs.

The easiest way to remove shoes from their backing plates is by disconnecting the retracting springs at their upper end from the anchor pin and removing the pins that hold them against the backing plate and then lifting the complete shoe assembly off the plate. The assembly can be disassembled by folding one shoe over the other so the



Slotted key washer retaining shoe alignment springs is removed by twisting into register with pin. Shoes may now be removed.



Easiest way to separate shoes is simple trick of folding one over the other so that adjusting link and spring can be removed.

BRAKE SERVICING

adjusting link at the lower end of the shoes can be disconnected from them. Rear shoes are a little more difficult to remove than the fronts because of the emergency brake linkage. It is important to remember how this linkage is attached to the shoes so it can be reinstalled easily. Clean all the parts thoroughly so they will be ready to be reinstalled with the relined shoes. To reinstall the shoes on the backing plates, reverse the procedure you used to remove them.

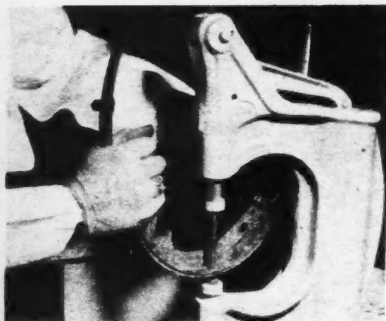
Shoes and backing plates must be lubricated before they are assembled so the shoes will move on the plates with a minimum of friction. This guarantees squeakless operation and that the shoes will return to their released position as they should. The lubricant to use is made by Bendix and it is called "Lubriplate." Lubriplate is an almost white grease with a high melting point that enables it to remain in place on the plates and shoes when the parts get hot.

Points to lubricate are the pads on the backing plates on which the shoes rest, surfaces of the anchor pin contacted by the shoes, the surface around the holes in the shoes for the pins that hold the shoes against the backing plate, the slot at the lower end of the shoes that is contacted by the adjustable spreader bar, the portion of the shoes for the rear wheels that is contacted by the emergency brake linkage, and the surfaces on the shoes and anchor pin contacted by the

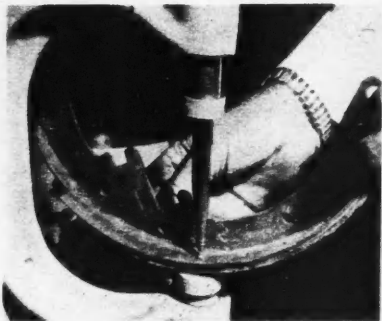
retracting springs. Only a dab of the lubricant should be used at each of the spots mentioned because if too much is applied it may get on the lining. Be careful not to get any of the lubricant on the lining while lubricating the parts because it will affect the lining's friction characteristic.

It is important that the retracting springs at the anchor end of the shoes be installed correctly. The spring for the front shoe should be installed first so its anchor end will be in line with the web on the shoe. This is necessary so the force the spring exerts on the shoe will be parallel to the backing plate. If the spring is installed on top of the spring for the rear shoe, its force may have a tendency to pull the shoe away from the backing plate as well as back to the anchor pin. It isn't important for the tension on the rear shoe to be on a line absolutely parallel to the backing plate because this shoe is already against the pin when the pressure on the brake pedal is released.

Before installing the front hub assembly on the spindle, be sure the drum and the inside of the hub are clean. It is usually recommended that the friction surface of the drums be cleaned with carbon tetrachloride to ensure that they are completely free of grease. However, when using carbon tetrachloride be careful not to inhale its fumes as they are extremely dangerous and if inhaled for any length of time can cause death. The inside of the hubs must be clean so there will not be any grit



Old lining is removed from shoes after using punch press to drive out rivets. Your neighborhood brake shop has this machine.



New lining must be held against shoe with clamp band while new rivets are crimped into place. This stage is best done by garage.

them to get into the wheel bearings. Bearing cups and the rest of the inner surface of the hubs should be given a light coat of wheel bearing lubricant. The cups need the lubricant for their bearings and the rest of the surface needs it to prevent their rusting. Don't load the hub with lubricant because this won't help lubricate the bearings and it isn't impossible for the lubricant to get on the lining.

Bearings should be packed, preferably in a good packing machine, so their roller or ball retainers are full of lubricant. Place the inner bearing in the hub and tap a new grease re-ainer into the hub. Install the hub on its spindle. If the drum won't slide over the brake shoes, change the adjustment of the shoes. Slip the outer bearing onto the spindle and into the cup in the outer end of the hub, place the flat washer on the spindle, and run the spindle nut up against the washer.

The method of adjusting front wheel bearings depends on whether they are roller or ball bearings. Tapered roller bearings are usually adjusted to 3 or 4 foot-pounds of torque and ball bearings must, as a rule, be somewhat tighter. It would be wise to take the time to check a shop manual for your car to find out exactly how its bearings should be adjusted. This might save you trouble in the future resulting from bearing failure, erratic brake action, and peculiar handling. In any case the bearings must not be too loose because if they are they will be pounded and damaged by the action of the wheels. After the bearings have been adjusted, lock the nut on the spindle with a new cotter pin of the correct size.

Install the rear drums by slipping them

over the bolts in the axle flange or onto the tapered end of the axle shaft. If the axle is tapered, install the flat washer and nut on the end of the shaft and tighten the nut tight so the drum's hub won't be able to work on the shaft. Lock the nut with a cotter pin.

The next operation is adjusting the brakes. The theory of adjusting brakes of this type is to center the shoes in the drums so they won't drag when they are released and so they will contact the drums with a minimum of pedal and shoe movement. According to most brake manufacturers adjustments should be made with feeler gauges inserted between the lining and the drums but this is the slow way and most fellows use a method that depends more on feel than on actual clearances.

The method of making the adjustments will depend on the type of anchor the brakes have. If the anchor is of the fixed type all that must be done is adjust the spreader bar at the bottom of the shoes. This is done by turning the star wheel on the spreader until the drum and its wheel can just be turned by hand and then backing-off the star wheel 12 to 14 notches. The drum should turn freely after the star wheel has been backed off but if it doesn't there is something wrong with the shoes or the drums.

If the brakes have adjustable anchor pins, the pins will have to be adjusted too. This is done by turning the star wheel until there is a heavy drag on the drum and then loosening the nut on the anchor pin approximately 1 turn and tapping the pin up or down until the drum is free. Then the star wheel is turned again until the drum drags and the anchor is

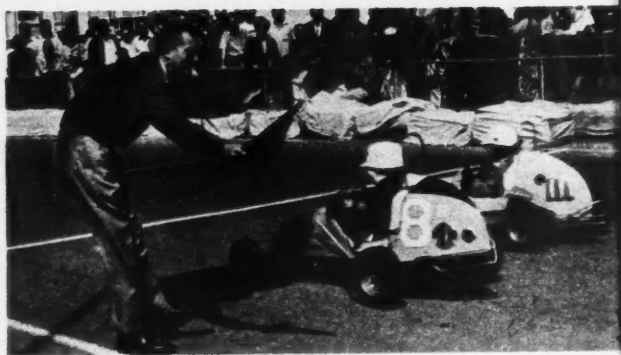


After shop installs new lining, shoes are placed in special drum grinder to contour lining to exact radius of particular drums.



By reversing previous procedures, separated shoes are put back together and replaced. Do not mis-match shoes and drums.

400 QUARTER MIDGETS



TROLL AT VEGAS



*Junior Chamber of
Commerce teams with
Hacienda Hotel for
Las Vegas' first annual
Invitational
Championships*

BY DICK DAY

Photos by Medley, Day

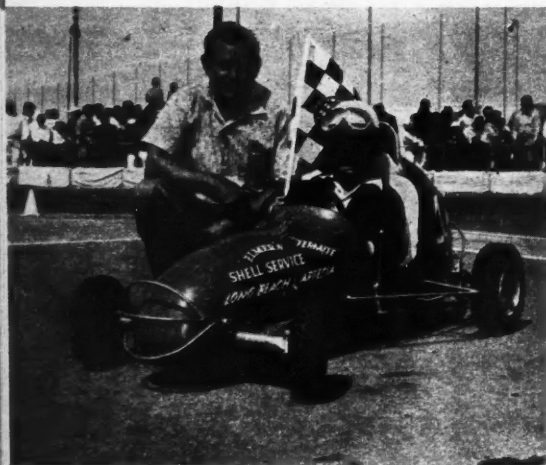
Hotel Hacienda's new asphalt $\frac{1}{20}$ th
oval track located on famed Vegas strip
was site of JC's huge invitational
race meet. Moss Engineering's tech
advisor and recent Indianapolis winner,
Sam Hanks (left), served as honorary
starter for the big two-day affair with
entries running some four hundred for
the timely pre-Easter vacation weekend.
Saturday was the scene of heavy
qualifying while Sunday carried a full
thirty race program for all classes;
stock, modified, open gas, fuel,
in both junior (4 to 8 years)
and senior (9 to 15 years) divisions.



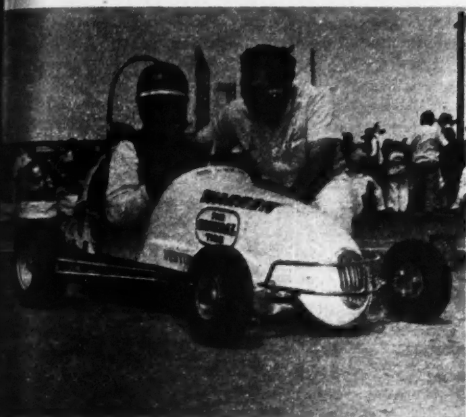


400 QUARTER MIDGETS ROLL AT VEGAS

Danny Caruthers (No. 8) of Anaheim, California and Larry Johnson of Las Vegas duel it out with some tight cornering. Caruthers, at the age of seven, has some three years of driving experience to his credit...and the trophies to prove

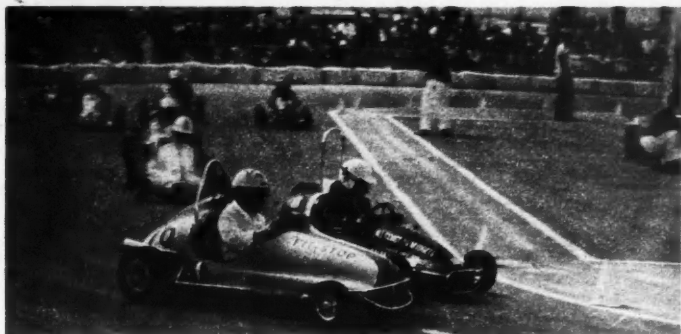


Spouting a few happy tears, eight year old driver "Termit" Dekker of Norwalk, California poses with father shortly after capturing 30 lap "Junior Stock" main event. Car is home-built.



Mary Jo Mitchel, hot distaff pilot from Ventura, California, showed male chauffeurs quickest route to checkered flag in the "Senior Stock" main with her Mantz-built $\frac{1}{4}$ midget racer.

Below and outside, eight year old Marv Webster, Mill Valley, California, overtakes San Francisco's Guy Donefrio, to emerge victor of the "Junior Modified" main. Webster drove a Kurtis.



team
permits
California, qualified his Viking-Craft at 7:63 for meet's fastest
y after
Stock
e-built
Mike Olivero, 14, of Lynwood,
California, qualified his Viking-Craft at 7:63 for meet's fastest
y after
Stock
e-built
Break down on entries
were as follows: Junior Stock
Class, 62 cars; Senior Stock
Class, 54 cars; Junior Modified
Class, 19 cars; Senior Modified
Class, 60 cars; 8 cubic inch
Class, including both junior/
senior entries, 17 cars; Open
Gas Class, including both junior/
senior entries, 40 cars. Post
entries and nonqualifiers are not
included in the above totals.



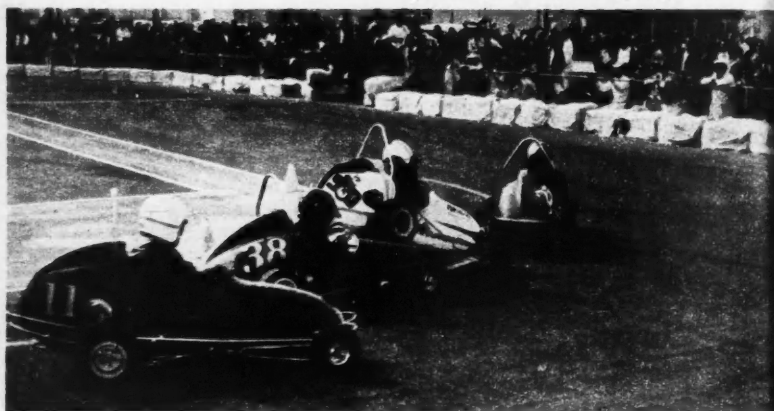
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QUARTER MIDGETS

ROLL AT VEGAS

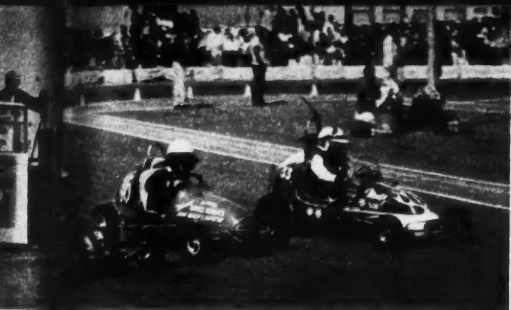


Gasoline for Vegas meet was furnished through the courtesy of Hancock Oil Company who sponsor \$1000 QM scholarship in So. California.



Below, 14 year old Hal Pemberton of Glendale, California, shortly after capturing senior division's Modified main event. Above, Hal (No. 11) can be seen safely heading his rapid H. P. Safe special toward perimeter of track negotiating the tight cornering techniques displayed by Chris Shelly, also of Glendale, and Kenny Elam of Van Nuys, California. The Teen-age drivers of the QM fraternity have a real habit of living it up in the tight oval corners.





ed through "McHal's Gal" little Laura Wyckoff leads
ny who... car string off straightaway into cor-
. Calif., Dekker, center, was eventual winner.



Celebrity, Art Linkletter, of TV and radio fame, congratulates Marv Webster, winner of Junior Modified. Vegas celebrities were highlights of invitational races.



Real champs, Mike Randle, Glendale, California, and "Frosty" Snow of Fresno, Calif., congratulate one another after almost dead-heat finish in 8 cubic inch Modified main. First place went to Randle in Kurtis (left) while Snow toolled sleek Hornet-Mite.



Chuckie Van Dusen of Riverside, California, drove his Binks McClean Special to victory in the highly competitive Open Gas class numbering a fifty car entry. Eight hundred dollars worth of trophy awards donated by Vegas business establishments were presented the small fry racers. Three McHal crash helmets were awarded to the boy and girl traveling farthest and to youngest novice entry. A Mace Midget trailer was also given.




Steve Kuster, hot Viking-Craft pilot of Van Nuys, California, went home with Open Fuel victory. Although Calif. entries ran high, some seven Western states were well represented at this largest of quarter midget meets.

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CUSTOM
 QUERIES

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**NEIL
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BUMPERS

Dear Neil:

I would like to install a set of '49 Plymouth bumpers on my '49 Ford. Will the brackets have to be modified or will they fit right in place? Also, what headlight rings would you suggest I use in frenching in my headlights.

—Dennis Parchem
 Chicago, Illinois

There are three different lengths of bumpers made for the '49 Plymouth. I would pick the length best suited for your Ford and modify the bumper bracket to get a proper fit. As for headlight rings, the '51 Ford ring will look real smooth frenched in. If you would like a slightly tunneled effect, use the '53 Mercury ring.

MERC RESTYLE

Dear Neil:

I am presently customizing my '51 Mercury and I am seriously considering a '54 Chevrolet grille and '54 Merc taillights for it. My problem is will they fit? If not what do I have to do to them or the car in order for them to fit?

I enjoy reading your section in CAR CRAFT and any tips you can give me on customizing my Merc will be greatly appreciated. Thank you.

—Alan Pastore
 New Hyde Park, New York

You have chosen swaps that are not only good style-wise but are readily adaptable. The '54 Merc taillights will fit quite well either stock or frenched. As for the grille, it will depend on

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CUSTOM QUERIES

as they vary. Another thing that should be checked for closely is high spots against brake drums.

CHEAP LIGHT

Dear Neil:

I have a '57 Ford and am interested in restyling the taillights. Could you give me some hints that wouldn't take too much alteration and as little body work as possible? Also could you give me an idea as to price?

— Ray Eckerle
Louisville, Kentucky

I know of two inexpensive ways to restyle your taillights that will require no body work at all. One is to retain the stock lens and make a wire mesh screen that will fit around the lens, cone to the outside of the rim. The other is an accessory blinker called "Satel-Lites" which is now available.

GRILLES FOR '51 OLDS

Dear Neil:

I have a '51 Olds "88" that I plan on customizing. I would like to know what grille I can put in it without too much trouble or expense? Do you know of any taillights that would fit the contour of my fender without any alterations?

— Bud Andersen
La Crescenta, Calif.

We have an "egg crate" type accessory grille in stock that will replace the center grille of your Olds. I believe that any taillight conversions on this model will require some reworking or filling of the fenders in order to make any changes, Bud.

COM-PRE KIT

Dear Neil:

Looking in one of my back issues of CAR CRAFT (May '56) I read of your "Com-Pre" kit for lowering the rear end of cars with coil springs. I own a '50 Olds and would like to lower it in back without taking a torch to it. I would like some dope on your kit such as, price, where I can buy it, and what principle does it work on?

— Larry Smith
Spokane, Wash.

These kits give a 2 1/2" drop, Larry. They are
containing reheated in a furnace, pressed to size, then
should be tempered. They can be purchased from: Valley
Custom, 1871 Victory Place, Burbank, Calif.
Price is \$25 plus shipping. 25% deposit re-
quired on all orders.

THREE-FOLD SWAP

Dear Neil:

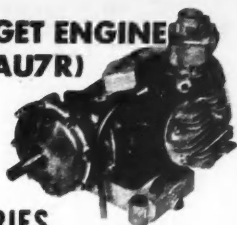
I own a '57 Ford Convertible and am plan-
ning to change the grille, front bumper and
taillights. The best combination I can figure
out would be a '58 DeSoto bumper and grille
and '58 Edsel Station Wagon taillights. I
would like to know your opinion of this com-
bination? Will the DeSoto bumper fit the
Ford with ease or will I have some difficulties?
Also will the Edsel taillights clear my present
bumper or will the rear bumper have to be
changed. Please advise me.

—Louis Oroz
Patchogue, New York

I could not say as to how close this will come
to fitting. Any conversion usually requires a lot
of thought, measuring, etc., to gain your ob-
jective. I would suggest trying to use a complete
bumper and grille assembly in case of any
future replacement. As for the taillights, again
I would say to use the complete units. You can
reshape both the front and rear fenders to fit
the modifications you've mentioned. This combo
adapted to your '57 Ford should prove to be
a very good stylewise.

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CUSTOM QUERIES

TRIM TROUBLES

Dear Neil:

I have a '50 Olds "98" and was wondering if two '56 Packard taillights set together at a V angle would look good on this model. I have completely shaved off all of the trim and was thinking of putting on '54 '55 DeSoto trim, with the bottom piece going into an aircoop. Do you think it would look satisfactory or do you have a different suggestion?

— Bud Carroll
Cupertino, Calif.

It would probably be better to use the Packard taillights as they are. If you want a light appearance Bud, I would say to use '54 Buick Roadmaster taillights. For the side trim, I believe '56 Chevy "210" or '54 Buick side trim, running into the aircoops, would look real good.

HUDSON SWITCH

Dear Neil:

I have a '49 Hudson Commodore 8 and don't care for the grille design. I have a chance to pick up a complete '50 Hudson Commodore 8 front assembly, including grille, hood, fenders and bumper. Is this assembly interchangeable with my present front end or will it involve extensive modification to make it fit? Thank you in advance.

— Robert Slavens
Sheboygan, Wis.

I believe that the body shells are the same in the same series. To be perfectly safe you had better check the Hudson's parts book to see what is interchangeable. I think this switch can be made with a minimum of modifications.

EARLY FAN

Dear Neil:

I have recently acquired a '36 Ford Coupe

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and would like to know what grille will go the route the easiest and still give a custom look? I also want to lower the rear end and I would like to know the best method to employ?

—Tom Martin
Bridgeport, Conn.

There are a number of ways to restyle these grilles but, as you are looking for the easiest way, I would suggest using either the '41-'47 Packard grille with paneled sides or the '38-'39 Nash grille. The best method for lowering the rear end of these models is to de-arch the spring, reverse the eyes and shorten the second and third leaf if necessary.

SKIRT CLEARANCE

Dear Neil:

I am in the process of making a mild custom out of '50 Dodge two-door. So far have put '49-Ford taillights on, in a vertical position and shaved the hood and deck. I now want to add fender skirts but find there is only 1/2 inch clearance between the skirts and the tires. What minor change, if any, could I make to enable me to install the skirts? I will appreciate any help you can give me.

—Melvin Edwards Jr.
Ebensburg, Pa.

The wheel openings will have to be braced out wider from the body. I would suggest installing a skirt that has a flared mounting edge on the bottom.



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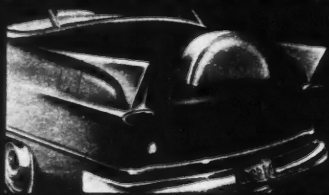
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By Bob Pendergast

SIX SITUATION

Dear Bob:

I'm getting ready to hop-up my '49 Plymouth six, and would like to know what you think of my plans. I want to bore it out, racing pistons, hot cam, milled head, carburetor manifold, and give it a port relieve job.

— Ed Hall,
San Gabriel, Calif.

Right on, Ed, up to but not including the porting and relieving. Porting is necessary for the Plymouth 6, but relieving is not necessary or desirable. Flathead Mercs relieved because the valves are set at an angle in relation to the cylinder bores, and thus have a ridge between the valve seat and the cylinder that is an obstacle to smooth, unimpeded flow of gases in and out of the combustion chamber. Engines like yours, the Ford 6, Ford 8, etc., that do not have this problem do not benefit from a relieve job. For the porting, I recommend that you merely clean them out and remove any ridges left from the casting process.

CHEV-PLY MERGER

Dear Bob:

Can I put a Chevrolet V-8 into my Plymouth without changing the transmission and rear end? This will be my first modification, and I want to do it right the first time.

— Bill Smith,
Crestview, Florida

To do it the right way, you'll have to change the transmission and rear-end. There is an adaptor commercially available to mate-up the

CONTINUED ON PAGE 6

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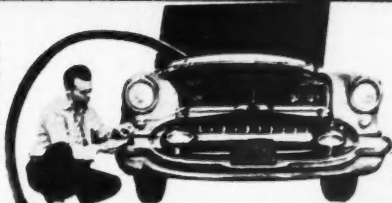
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ENGINE SOUPING

quarter midget

holding threads is concerned and it would be easy to ruin the rod by too much pressure on the bolts. The stock capscrew lock plate is not used with Allen bolts.

The reduction gear is installed with a bronze spacer washer on the shaft on each side of the gear and then the gear cover and its gasket are bolted to the housing. Kong uses hardened Allen bolts for the cover instead of the stock bolts and he locks the three that go completely through the ears on the case with nuts that tighten against the back side of the ears. On the remaining bolt he uses a lock washer because it screws into a blind hole in the case.

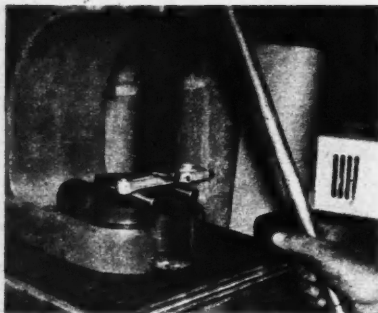
The inner part of the flywheel shroud is bolted to the block with the three stock bolts and then the Woodruff key for the flywheel is tapped into the slot in the crankshaft. If a stock flywheel and magneto are being used, the coil support plate is also bolted to the block. The flywheel is then slipped onto the crankshaft and locked in place with the stock lock washer and nut. The crankshaft is held so the nut can be tightened by placing a clean block of wood between the crankshaft and the side of the opening in the bottom of the crankcase. The nut must be tight so the wheel won't have a chance to work loose as the engine is accelerated and decelerated. When the nut is tight, the outer flywheel cover is installed.

The ignition is installed by slipping it into the opening in the top of the block. As the shaft is inserted in the block it will push the dummy shaft used to hold the camshaft in place out of the bottom of the block. The hole in the lower end of the shaft is aligned with

the hole in the camshaft and the tubular Roll pin that locks the ignition to the camshaft is pressed into the hole. The hole in the ignition shaft will align in only one position with the hole in the camshaft because the hole is on a 10 degree angle to the shaft's centerline. This eliminates much of the trouble of timing the ignition to the piston.

The ignition is timed more precisely so the engine will start by turning the crankshaft to the point where the piston is $\frac{1}{4}$ to $\frac{5}{16}$ of an inch from the top of the cylinder on the compression stroke. With the piston in this position the ignition housing is rotated to the point where the leading edge of the breaker cam is just starting to open the points and then it is locked to the crankcase with a hex head capscrew. The theory behind setting the ignition in this manner is that for each .100 inch of piston travel when the piston is near the top of the cylinder, the distributor shaft rotates 9 degrees. Kong has found that the engines he builds require 25 to 30 degrees of advance for normal running conditions. The timing is adjusted each time the engine is run to give the best performance for the weather on that particular day.

The oil sump, with its dip trough in place and its gasket, are attached to the block with the two stock capscrews and the sump is filled with oil. About a pint of oil is poured into the sump and then the engine is tipped onto its reduction gear side so the oil can run into the gear case. Then the engine is set back on its base, in its normal position, and the oil allowed to seek its normal level. More oil is then added to bring the level to the full mark on the dipstick. Oil SAE 30 to 50 vis-



Hydraulic press is used to remedy any bend found in rod. Note how rod is supported, pressure applied to avoid creating knicks.



With rod verified straight, piston and pin may be assembled on it and alignment of the entire assembly checked for accuracy.

costly is used in most of these engines that have been modified for racing, depending on the preference of their owner, and Kong recommends SAE 40 in the engines he builds. SAE 30 is recommended for stock engines.

The intake manifold and its gasket are bolted to the block with two Allen bolts and then the Marvel-Schebler carburetor and its gasket are bolted to the manifold.

The cylinder head is held on the block with $\frac{3}{4}$ -inch diameter, 16 thread Allen bolts $1\frac{1}{2}$ inches long. Flat steel washers approximately $\frac{1}{4}$ -inch thick are used between the bolt heads and the cylinder head to spread the pressure exerted by the bolts over a greater area and to prevent damage to the bolt holes in the head. The head and its gasket are aligned on the block by the two dowels installed previously in the block. The bolts are tightened to 28 foot-pounds of torque.

The gap in a Champion J3 side-electrode spark plug is adjusted to .025-inch and the plug is fitted with a new gasket and screwed into the head. The plug is tightened to 25 foot-pounds.

From this point on the balance of the job consists of the installation of the engine in the chassis and this depends on the chassis.

After the engine is bolted in place, the exhaust pipe is installed. The pipe Kong uses has an inside diameter of .950-inch and is approximately 18 inches long. The length and diameter of the pipe has much to do with the engine's ability to run at high speeds.

To determine the results of the modifications in terms of horsepower, we took the engine to San Bernardino and ran it on a dynamometer at Scotty's Muffler Shop. This shop is owned by C. W. "Scotty" Scott, a hot rodder from way back when, and as part of the equipment it has a tiny dynamometer made especially for Continental engines.

Scotty doesn't claim that the "banana" scale on the dynamometer has the necessary accuracy to enable actual horsepower computations to be made but it is close enough for before and after comparisons when changes are being made to an engine.

Despite Scotty's doubts, we took for granted that the instrumentation on the dyno was 100 percent accurate (and it may be) and computed the results for a stock engine that we ran, which was complete except for its governor and air cleaner, and then for Kong's engine. These were the results:

Stock engine:

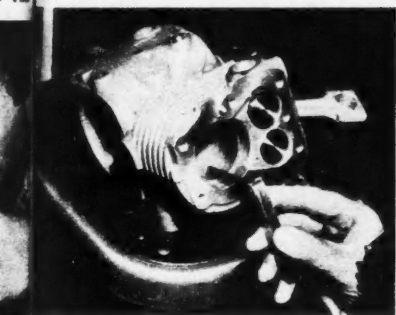
RPMs	Horsepower
3000	3.85
4000	4.75
5000	5.23
6000	4.84

Kong's engine:

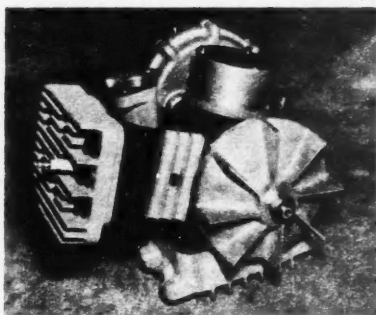
RPMs	Horsepower
5000	9.04
6000	9.13
7000	10.00
8000	8.38
9000	5.14

The dyno wouldn't hold the engine under 5000 rpm.

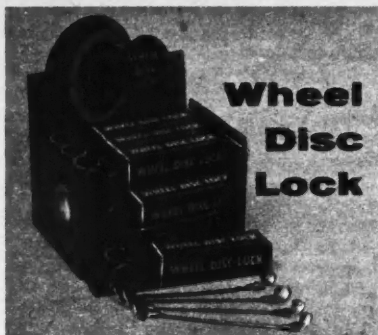
These results were considered extremely good for an engine running on gasoline and with a stock camshaft, and Scotty said they were disgustingly good in comparison to some of the alcohol-burning A class engines he has run on the dyno. It looks as though Kong is on the right track, because cars equipped with engines modified exactly as described here have set some enviable records. Best times to date, on standard size Q.M. ovals, are 8.39 on dirt and 7.43 on asphalt. This was achieved using stock cams, and running on pump gasoline — where there's a will there's a way!



With oversized-head and undersized stem valves in place, piston ring end gap is checked before final assembly of engine.



Completed Kong engine shows head, manifold, valve door, flywheel, sump of aluminum (for cooling); Roto-Faze ignition.



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WHAT'S YOUR PROBLEM? continued

Chev bellhousing with the Ply trans, at present time. Since both the Chev and Ply have semi-elliptic rear leaf springs (fore and aft type) you can take your choice of any rear end mounts in this manner and just re-position the spring attachments on the axle housings to suit the Plymouth width. Best make sure the transmission that goes with the rear-end you select is one that can be adapted to the Chev engine. Currently, this would limit you to either Ford or Chevrolet rear-ends and transmission, with the Ford being the sturdier of the pre-war units, and also having ratios more favorable to the Chev's steep torque curve.

CHEVY V8 QUERY

Dear Bob:

I have a dual 4-barrel manifold from a '55 Chev "270," and am wondering if it will fit properly on my '55 Chev V8 engine. I would like to know if high-compression head gaskets are advisable for my '55.

— Dan Cabur,
Cleveland, Ohio

The "270" manifold will fit on your '55, but the ports in the manifold will be larger than those in the heads. Although '55 and '56 heads

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WHAT'S YOUR PROBLEM? continued

have been known to be ported out to "270" (Corvette) size, it's a long tedious and unless you do it yourself it's going to you, besides running the ever present risk "going through into the water," if you what I mean. Better you should pick up a of '57 Corvette heads to take full advantage of the increased carburation, and due to the smaller chamber volume raise your compression up to more than you could get with thin head gaskets. The gaskets used by Chev V have proven themselves to be more than enough on numerous competition engines. So builders even sacrifice a little compression use a thicker-than-stock gasket for just this reason, so a word to the wise should be sufficient.

HYDRAULIC CONVERSION

Dear Bob:

I am building up a '36 Ford coupe, and present am putting on '48 Ford hydraulic brakes. I would like to know how to install a '48 Mercury master cylinder.

— James Dacatelli,
Staten Island, N.Y.

In a word, don't. Use a '39 master cylinder and pedal assembly, including the clutch pedal support bracket, as it is a perfect fit in a '36 frame. Go down to your friendly junkie's and have him torch one off for you, then take it home and bolt, or better yet, weld it in. He up your lines and you're off and running.

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This record reflects the excellence of the engine components and the mechanical skill of this team. It's an achievement in mechanical engineering, not chemistry, as are fuel records.

This is another example of what is becoming more obvious every day, that if you want to go fast, get an Oldsmobile and if you want the fastest Olds, use an ENGLE Cam.

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BRAKE SERVICING

moved again. This procedure is repeated until movement of the anchor doesn't release the drum, indicating that the shoes are centered.

When the correct position has been found for the anchor, its nut is tightened, very tight, and then the star wheel is backed off 12 to 14 notches from a heavy drag. If the shoes fit the drums as they should and the anchor is in its correct position, the drum will be free when the star wheel has been backed off approximately 7 notches. If the anchors are not adjusted correctly the brakes will pull to one side or the other when they are applied.

The star wheel is turned with a brake "spoon" or a screwdriver. The spoon is the most practical of the two tools because it is best so it can be easily inserted in the slot in the backing plate. The brakes are tightened by moving the outer end of the spoon upward.

Some front brakes have an additional adjustment in the form of an eccentric that contacts one of the shoes. Eccentrics are adjusted by turning them in the direction of wheel rotation until the shoe they contact touches the drum and then backing them off until the drum turns freely.

The hydraulic portion of the brake system seldom gives trouble for many thousands of miles but it is a good idea to inspect it frequently for signs of fluid leakage, which is usually the first indication of trouble. The level of the fluid in the master cylinder reservoir is also a good indication of trouble

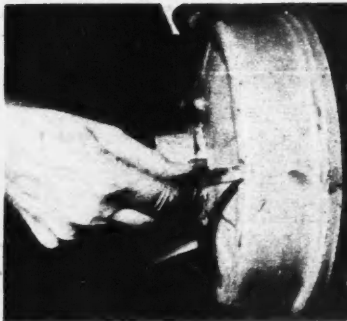
because if the level drops at an unusual rate you can be sure fluid is being lost from some part of the system. Leakage at the wheel cylinders is indicated by fluid on the inside of the tires. Fluid leaks from the ends of the cylinders, runs down the inside of the backing plates, and then drips onto the tires. If it should get on the lining it would be necessary to reline the shoes on that wheel. The reason for this is that a brake will not function as should when its lining is soaked with hydraulic fluid and it is practically impossible to get the fluid out of the lining.

Leaks in master cylinders can be either internal or external. Both types are bad but an internal leak is the sneaky kind that can't be detected visually, although its effect can be felt on the brake pedal because the pedal will slowly drop as a constant pressure is held on it. If the leak is bad enough the pedal will drop all the way to the floorboard without applying the brakes at all. An internal leak is caused by a worn or defective primary cup that allows the fluid in the outlet side of the cylinder to pass the cup and enter the cylinder reservoir. The fluid is prevented from leaving the cylinder by the secondary cup.

An external leak can be detected by fluid leaking from the boot at the open end of the cylinder. A leak of this type is caused by a worn or defective secondary cup that allows the fluid to leave the cylinder. A bad secondary cup can be the cause of the master cylinder



Anchor bolt is installed to hold the brake shoes in place while rest of the assembly is done, pending final adjustments on job.



After drum is installed use feeler gauge check clearance between shoe and drum. Follow manufacturer's specifications for the

under's failing by allowing the cylinder's reservoir to run out of fluid, enabling air to enter the cylinder. With air in the cylinder the brakes cannot be applied because the air compresses instead of exerting pressure on the pistons in the wheel cylinders.

When it is necessary to add fluid to the master cylinder reservoir be sure to clean the surface around its filler cap so there won't be any chance of dirt or other matter falling into it when the cap is removed. Any dirt that might happen to get in the reservoir could work its way into the cylinder and wear grooves in the piston cups. This would result in failure of the cups, possibly when the brakes were needed badly. The reservoir should be filled to within approximately $\frac{1}{4}$ -inch of the bottom of its filler opening.

Master cylinders and wheel cylinders can be overhauled by cleaning them thoroughly and then honing their bores, and installing new cups and other parts that are subject to wear. These operations require special tools and gauges that the average fellow doesn't have, making it an operation for a shop that specializes in this type of work. Most parts stores have rebuilt cylinders for the more popular makes of cars, making it easy to exchange a worn unit for one that has been rebuilt instead of reworking the old unit.

An alternative to buying a rebuilt cylinder would be to buy a new one. New cylinders cost more than rebuilt ones but in the majority of cases they are probably worth the difference. A new cylinder may have better workmanship and parts than one that has

been rebuilt and it may last longer.

Whenever a master cylinder is replaced with another it is necessary to adjust the cylinder's piston rod. This adjustment is usually made by turning the pivot bolt that holds the rod to the pedal or other member that moves the rod. With this sort of arrangement the portion of the bolt that passes through the eye on the end of the rod is eccentric to the body of the bolt, enabling the free end of the rod to be moved closer to or farther away from its seat in the piston by merely turning the bolt. The eccentric should be adjusted so the pedal moves approximately $\frac{1}{2}$ -inch before the rod moves the piston. This amount of pedal movement is necessary so the piston will be free to return to its fully released position in the cylinder when pressure is removed from the pedal. If the piston is prevented from returning as far as it can it is possible that the brakes will not release completely, causing them to remain locked or drag.

The hoses that connect the brake lines on the frame to the wheel cylinders seldom give trouble but if one does it is a simple matter to remove it and replace it with a new one. These hoses are made in many types and lengths for different cars and it is important to get the correct one for replacement purposes so it will be the correct length and its fittings will match those on the car. Hoses usually become defective by starting to leak, just as cylinders, and it is seldom that one will fail completely by bursting; however, if this should happen, the brakes would not work when the pedal was depressed.

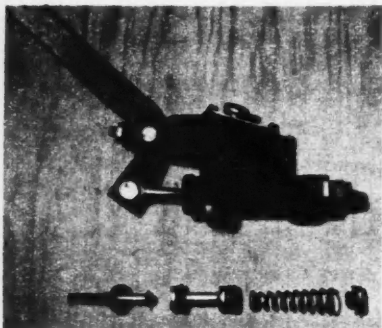


shoe assembly must be centered in drum to operate properly. Adjustment of anchor pin location at top of shoes takes care of this.

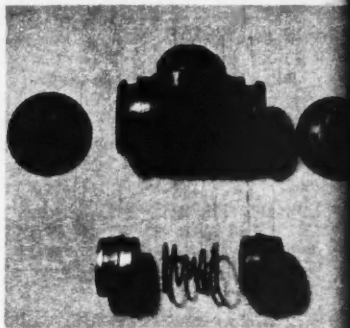


Lower ends of shoes are spread by turning star nut on adjusting link. Brake spoon is inserted through backing plate access slot.

BRAKE SERVICING



Master cylinder, GM type, with its components displayed below. L to R: piston rod, piston w/cups, return spring, check valve.



Disassembled wheel cylinder consists of end boots, pistons, their cups, and return springs. Replace cups, boots at intervals.

The replacement procedure for all the components of the hydraulic system is similar in one respect and that is that it is necessary to "bleed" at least part of the system after one or more of the components has been replaced. To bleed the system means to expel from it any air that entered it when one or more of its components was disconnected for any purpose. If there is the slightest amount of air trapped in the system the pedal will feel spongy, and if there is enough air the brakes will not apply when the pedal is depressed.

A system is bled by pumping whatever air is in it into its wheel cylinders and then out of the cylinders through valves provided on them for this purpose. Because air is lighter in weight than the fluid and therefore will make its way to the highest point in the cylinders, the valves are placed at the top of the cylinders to make it easy for the air to escape. The valves are opened, one at a time, and the brake pedal is pumped slowly. Pumping the pedal while the valve on one of the cylinders is open allows fluid from the reservoir on the master cylinder to enter the master cylinder and be forced into the system. This fluid pushes the air in the branch of the system that serves the wheel cylinder with the open valve ahead of it into the cylinder. To prevent air

from entering the system through the valve while the pedal is returning to its free position between pumps, a rubber hose with its free end inserted in a bottle containing fluid usually connected to the valve. This isolates the entire hydraulic system from the atmosphere. Care must be taken to not let the master cylinder reservoir run dry during the bleeding operation.

After a good brake reconditioning job, you can go in confidence, knowing that if necessary, you can also stop.

COMING ATTRACTION

Gay Cowie, blond and beautiful San Diego, calls your attention to a special how-to feature on dual axles slated for next month. This latest craze is spreading rapidly, so don't be left out. Be sure and pick up the August issue of CAR CRAFT.

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